

Agroterrorism: Minimizing the Consequences of Intentionally Introduced Foreign Animal Disease

**A Monograph
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Agroterrorism: Minimizing the Consequences of Intentionally Introduced Foreign Animal Disease

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Abstract

Agroterrorism: Minimizing the Consequences of Intentionally Introduced Foreign Animal Disease by Major James P. Dykes, United States Army, 61 pages.

The United States agricultural industry generates more than \$1 trillion in annual economic activity and provides an abundant food supply for the United States and other countries. Since the 9/11 attacks, the United States government has recognized the vulnerability of the agriculture industry and the potential for the deliberate introduction of animal and plant diseases or agroterrorism. An agroterrorist attack could have enormous economic consequences, disrupt the entire system of critical infrastructure and affect all Americans.

The federal and state governments must establish a comprehensive foreign animal disease strategy that is equal to the risk posed by agroterrorism and/or natural outbreaks. Critical elements of this strategy must reconcile conflicting worldviews and existing tensions between the federal and state government to synchronize all remediation efforts while increasing the nation's preparedness. Finally, the national strategy must address the population of first responders by recognizing the unique authorities, restrictions, and capabilities they possess. The Department of Defense (DoD) has the opportunity to mitigate the risk of agroterrorism to the nation because it possesses the inherent dimension, organization and equipment to rapidly deploy, and conduct operations in austere and geographically distributed areas of operation.

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Introduction

No country, state, or community is immune to the consequence of disaster.¹ Recent global events demonstrate that disasters can strike anywhere and create immense devastation with little to no warning. However, governments can mitigate and avert major catastrophe by instituting a culture of preparedness and through disaster planning.² Governments and citizens must be prepared to minimize incidents of national significance or large scale domestic emergencies. This requires emergency management organizations and communities to respond in a timely fashion and perform activities that reduce the consequences of disaster. Unfortunately, Hurricane Katrina vividly demonstrated that most people rely exclusively upon the government and by extension, emergency management organizations.

Today, many emergency management organizations narrowly focus their disaster planning upon anticipated or recurring environmental incidents. A cursory review of the existing emergency management literature demonstrates that major disasters represent the majority of disaster planning.³ Furthermore, most emergency management agencies categorize biological hazards or disasters that affect people indirectly as a secondary responsibility and dedicate fewer resources to mitigate the threat. Unless they are zoonotic, animal and plant diseases do not

¹ George D. Haddow and Jane A. Bullock, *Introduction to Emergency Management*, 2d. (Boston: Elsevier, 2006), xi.

² Ibid., 157.

³ Department of Homeland Security, *National Incident Management System* (Washington, D.C.: Government Printing Office, 2004), 132. Defines a major disaster as any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to supplement the efforts and resources of states, local governments, and disaster relief organizations to alleviate the damage, loss, hardship, or suffering.

directly affect people, but can disrupt the entire food supply along with the food processing industry.⁴

Regrettably, foreign animal disease (FAD) planning does not receive the commitment it requires from policy makers and/or emergency management agencies. In Kansas, the agriculture industry and related industries contribute almost half of the annual state revenue, but concerted planning efforts by Federal Emergency Management Agency (FEMA) and Kansas Division of Emergency Management (KDEM) focus almost exclusively on major disasters.⁵ The planning behind the new Madrid Fault Line represents not only the organizational energy of FEMA and KDEM but illustrates a false distinction between disasters.⁶ The author posits that any hierarchical relationship between direct and indirect disasters is spurious because all disasters share a common denominator, recovery costs. The primary thesis of this monograph is that FADs represent a growing threat to the national security of the United States and current FAD policies are inadequate.

This monograph will use a notional FAD incident to examine federal and state plans to respond and eradicate a FAD that can quickly spread across many jurisdictions. The notional incident is based off lessons learned as well as simulation exercises. The incident demonstrates the immediate and tertiary effects of a FAD spreading throughout a vital region and the accompanying challenges. The author will use and integrate the design principles taught at the United States Army's School of Advanced Military Studies (SAMS) to examine the operational

⁴ Zoonotic diseases or pathogens that can be transmitted from animals to people. Specifically, a zoonotic disease normally exists in animals can infect humans.

⁵ John Brogan (Emergency Management Program Specialist, FEMA Region VII) interview by author Kansas City, Missouri, March 7, 2010.

⁶ The New Madrid Seismic Zone or the New Madrid Fault Line, is a major seismic zone and source of earthquakes in the Southern and Midwestern United States. Earthquakes occurring at this fault line threaten parts of seven U.S. states: Illinois, Indiana, Missouri, Arkansas, Kentucky, Tennessee, and Mississippi.

environment and existing policies, statutes and directives, to identify challenges that accompany a FAD outbreak.

Finally, the incident highlights several tensions inherent to FAD incident(s) that the United States government must recognize. (1) Federal and state interests will not always coincide. (2) Response activities will require unique capabilities and partnerships throughout remediation. (3) Stop-movement orders require the cooperation of all neighboring states as well as the affected general populations to be successful. (4) Quarantines and remediation activities will quickly exhaust state and regional resources. (5) A timely and synchronized response requires rehearsed and institutional linkages among the population of responding agents such as the Department of Defense (DoD), the National Guard (NG), and civil authorities. (6) The deployment of active military forces to a disaster area will highlight existing tensions between active and reserve forces, the affected citizens, and civil authorities. (7) Timeliness is an absolute necessity to mitigate the dangers of FAD. (8) All agents must share a common understanding of the pathogen and appropriate response and remediation strategies to contain and eradicate dangerous pathogens.⁷

Methodology

This monograph is organized in four major parts. Part I – Introduces Agroterrorism, its accompanying characteristics, the nexus between terrorism and the agriculture industry, the interconnectedness of the agriculture and food industry, and concludes with an introduction of the dangers inherent with Foot and Mouth Disease (FMD) and the 2001 United Kingdom (U.K.)

⁷ Kansas Department of Emergency Management and Kansas National Guard, “High Plains Guardian, Military Assistance to Civil Authorities (MACA)” http://nabc.ksu.edu/assets/uploads/HPG_AAR.pdf (accessed 20 March 2010).

outbreak.⁸ Part II – Examines the risk to Kansas by introducing susceptible industries and accompanying geographic challenges. Part III – Explores the nation’s preparedness by examining federal and state legislation, statutes and policies that are germane to FAD. Part IV – Introduces specific recommendations by the author to increase the nation’s preparedness. The recommendations will reexamine the tensions identified in simulations and modeling exercises before offering strategies. Finally, the author will introduce potential roles that involve the Department of Defense (DoD).

Notional Incident

The Governor’s office in Kansas reports a confirmed case of FMD, a disease eradicated from the United States since 1929.⁹ Foreign animal disease specialists note that the outbreak is consistent with natural outbreaks in Europe, but are concerned by its sudden arrival in North America. Animal Plant Health Inspection Service (APHIS) epidemiologists report that the infecting strain is similar to one found in the United Kingdom in 2001.¹⁰ The World Organization for Animal Health or Office International des Epizooties (OIE) labels the United States “FMD Endemic” because of a slow and disjointed quarantine performed by state officials and a lagging

⁸ FMD is a highly contagious viral vesicular disease of cloven-hoofed animals. Although seldom lethal in adult animals, it causes serious production losses and is a major constraint to international trade in livestock and livestock products. Mortality rates in naïve animals approaches ninety percent.

⁹ The Center for Food Security and Public Health, Under “Foot and Mouth Disease,” <http://www.cfsph.iastate.edu> (accessed March 2, 2010).

¹⁰ The Animal and Plant Health Inspection Service is an agency within the USDA that protects agricultural health, regulates genetically engineered organisms, administers the Animal Welfare Act and performs wildlife damage management activities.

federal response.¹¹ The Secretary of Agriculture objects and asserts that the United States can regionalize and compartmentalize the disease and requests the OIE to revise its determinations.¹²

Meanwhile, global food companies have canceled orders, for beef and pork, animals and animal products, because of the designation. Unfortunately, APHIS FAD specialists and state veterinarians cannot trace the infection to any specific sources except for one major sale barn. APHIS FAD experts are concerned that the outbreak is no longer contained to Kansas because of the industry's rapid and vast transportation mechanism or agromovement.¹³ Authorities do not know how far FMD may have travelled throughout Kansas or other states because of the voluntary nature of the National Animal Identification System (NAIS).¹⁴

Privately, the Secretary of Agriculture is contemplating whether APHIS and other agents will be able to regionalize or compartmentalize the outbreak.¹⁵ In order to protect the industry and the livelihood of many Americans, the Secretary of Agriculture informs the President and

¹¹ The need to fight animal diseases at global level led to the creation of the Office International des Epizooties (OIE) through the international Agreement signed on January 25th 1924. In May 2003, the OIE became the World Organization for Animal Health but kept its historical acronym.

¹² Barry Pittman (DVM, MPH, DACVPM, Area Emergency Coordinator, Kansas/Missouri USDA, APHIS, Veterinary Services, Kansas Area Office) interview by author, Topeka, Kansas, March 2, 2010. When countries compartmentalize or regionalize OIE List A diseases, they can continue international trade.

¹³ Terry Knowles, James Lane, Dr. Gary Bayens, Dr. Nevil Speer, Dr. Jerry JAX, Dr. David Carter, and Dr. Andra Bannister. *NIJ Research Report: Defining Law Enforcement's Role in Protecting American Agriculture from Agroterrorism*. Information Report, Washington, D.C.: National Institute of Justice, 2005. The National Institute of Justice defines agromovement as the continuous cycle of movement required in farm-to-fork food production, including the transportation of animals as well as finished products destined for distribution throughout the world.

¹⁴ Department of Homeland Security, *National Strategy for Homeland Security* (Washington, D.C.: Government Printing Office, 2004), 4. The National Strategy for Homeland Security defines a state to mean any State of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the trust territory of the Pacific Islands; The United States Department of Agriculture created the National Animal Identification System (NAIS) to enable a forty-eight hour trace back of the movements of any diseased or exposed animal. The program was widely opposed by producers due to the invasiveness of the program. Subsequently, the USDA revised the NAIS policy on February 5, 2010.

¹⁵ Robert Axelrod and Michael Cohen, *Harnessing Complexity* (New York: Simon Schuster, 2000), 153. Axelrod and Cohen define an agent as a collection of properties, strategies, and capabilities for interacting with artifacts.

state governors about the growing potential that FMD may have spread throughout the mid-west and well into major cattle facilities throughout America. The Secretary of Agriculture is strongly suggesting that each state governor direct a more expansive effort that involves active surveillance, testing, and monitoring of all livestock and food processing facilities within their territories. Privately, the Secretary is contemplating his/her authority to enact 'extraordinary powers'.¹⁶

The USDA is increasing surveillance activities within the food industry, while APHIS and the Kansas Animal Health Department (KAHD) euthanize 50,000 head of cattle and all other susceptible livestock within a ten-kilometer zonesurrounding the infected premises.¹⁷ The livestock depopulation effort is growing larger and taxing personnel involved with remediation. While all agents seek an efficacious method to dispose of the carcasses, centralized decision-makers are receiving differing opinions from federal and state authorities. Responding agents debate various methods to address the growing carcass pile involving: (1) Site conditions; (2) Vector Potential; (3) Available Resources; and (4) Urgency; while decision makers are attempting to reconcile cost, timeliness, ease of implementation, and residual pollution.¹⁸ One thing is certain, carcass removal will likely consume sixty days of tedious work involving heavy construction equipment, personnel, and routine testing to verify that the FMD virus is destroyed.

Internationally approved sterilization protocols require the decontamination of all fences, fence posts, gates, food troughs, soil and manure, as well as all the facilities and equipment

¹⁶ The Secretary of Agriculture has broad authority to eradicate FADs. The Secretary is authorized to: (1) Impose quarantines on any state or territory (21 USC § 123); and (2) Seize and dispose of infected livestock and prevent dissemination of the disease (21 USC §134a).

¹⁷ Barry Pittman (DVM, MPH, DACVPM, Area Emergency Coordinator, Kansas/Missouri USDA, APHIS, Veterinary Services, Kansas Area Office) interview by author, Topeka, Kansas, March 2, 2010. The OIE established a ten kilometer zone as an adequate method to eradicate the FMD disease. This has also been a coined "ring-control" strategy by many emergency management officials.

¹⁸ National Center for Foreign Animal and Zoonotic Disease Defense, "Carcass Disposal Method: A General Overview," <http://fazd.tamu.edu/events/emergency-management-of-mass-animal-mortality-workshop> (accessed March 20, 2010).

located on the site. The infected feed yard measures one and a half miles by two miles.

Environmental Protection Agency (EPA) approved or waived disinfectants are used to disinfect the facilities and equipment, while the decontamination of the feed yard requires the removal of the top six inches of soil and composting. The composting process is an enduring process until testing indicates that the soil is free of the disease. Authorities must duplicate this response at every location within the ten kilometer infected zone as well as additional infected premises.

The governors of Kansas, Missouri, and Oklahoma report that state and local law enforcement forces will continue enforcement of the stop move order to contain the outbreak, while initiating additional state-level initiatives to accelerate remediation efforts. Law enforcement officials report that a small number of people have attempted to violate the quarantine and additional tensions are emerging between the government, law enforcement, and the affected population. Responding federal and state agents continue to find that centralized decision-making is lacking and conflicting. Because more states are endangered, FAD specialists, producers, and the industry alike are increasingly aware that the incident is rapidly becoming unmanageable. Meanwhile, faced by decreasing commodity prices, more cattle producers are reducing their herds, infected or not, to minimize their capital losses and preserve their livelihood.

A secondary effect of the stop move order has created severe disruptions of all interstate travel and trade resulting in major delays of all goods transported via tractor-trailer across the nation. Following positive testing of the virus, the Food and Drug Administration (FDA) condemned small quantities of FMD positive meat and a growing number of groceries and consumers are increasingly refusing beef and dairy products from Kansas, Missouri, and Oklahoma. Nationwide, a staple, is growing increasingly scarce and costly.

The media and population continue to grow increasingly restive as citizens confront the effects of the outbreak, depopulation of livestock, and growing carcasses. Producers are now growing more concerned about their ability to remain solvent, revitalize their farms and business, while facing continuing increases in their variable and production costs. The National

Cattleman's Association, the American Farm Bureau, ..., etc. increase their efforts to lobby Congress for emergency loans and debt relief guarantees while congressional representatives from Kansas, Missouri, and Oklahoma begin pressing for additional federal assistance. Major food companies are becoming disorganized as market uncertainties disrupt both their supply and production chains.

State and federal FAD specialists are traveling throughout Kansas, Missouri, and Oklahoma to test for signs of FMD while the USDA is enhancing their efforts to inspect meat at all food industries. The Department of the Interior (DoI) is growing concerned that local wildlife will become infected and spread the disease to other parts of the nation. All Americans are growing more aware of biohazards as they are reminded about the ongoing movement control, the expanding remediation efforts, and an apprehension concerning the safety of their food supply.

Each state is struggling to maintain the stop movement order and sustain existing quarantines while re-directing interstate traffic around affected areas. Adjacent states must also inspect or halt all livestock traveling to and from infected states, and redirect uninfected livestock around the quarantine areas or into large holding areas to contain the outbreak. Each holding area is logistically difficult to sustain. Authorities must provide large quantities of food and water while managing animal waste to prevent a sanitation hazard. Officials at holding areas also actively manage the herd until the livestock owners decide whether to slaughter the animals or return them to their point of origin following virus testing. Producers must make decisions based upon fluctuating commodity prices and uncertain production costs. Regardless, the eradication effort requires the persistent establishment of quarantine areas, holding areas, and the personnel and equipment necessary to operate each site.

State governors are now considering the deployment of National Guard forces to assume a greater responsibility of all response and remediation efforts to reduce the workload on law enforcement organizations. The Defense Coordinating Officer (DCO) has submitted a report to the United States Northern Command (NORTHCOM), detailing the response activities performed

by the states of Kansas, Oklahoma and Missouri that states that the probability of containment is decreasing. Following definitive identification by FAD diagnosticians located in Plum Island, New York, NORTHCOM drafted a potential active military response that enhances the command and control, engineering works and manpower to expand the quarantine and increase the pace of remediation efforts for the Secretary of Defense.

Ultimately, the governors from Kansas, Missouri, and Oklahoma request a presidential disaster declaration to obtain federal resources. The President of the United States consults with the Secretary of Defense and the Secretary of Homeland Security before approving the deployment of a Joint Task Force (JTF) to support APHIS, USDA, and FEMA. The deployment consumes ninety-six hours before active military forces arrive in affected states. Local media outlets and ill-informed citizens debate the legality of federal troops and the legitimacy of the mission based upon a popular misunderstanding of the Posse Comitatus Act (PCA).¹⁹

The states continue to expand their efforts. The Principle Federal Officer (PFO) directs federal forces to support the operation of all holding areas and assist in the remediation efforts from the Joint Field Office (JFO).²⁰ The state governors direct the State National Guard (NG) to cooperate with the federal forces but jealously guard their independence from federal authority. The JFO, APHIS, and JTF CDR are conducting strategic communications to inform the public of ongoing efforts and biological hazards. The command relationship remains vague but troops are

¹⁹ The Posse Comitatus Act governs and restricts the use of military forces to perform law enforcement duties. However, the United States constitution and Department of Defense Directive (DODD) 3025.15 and 5525.5 provide definitive guidance that governs the use of military forces within the United States in exigent circumstances.

²⁰ Department of Homeland Security, *National Response Framework* (Washington, D.C.: Government Printing Office, 2008), 66. The Secretary of Homeland Security designates the Principle Federal Officer (PFO). The PFO represents the Secretary of Homeland Security in the field. The PFO ensures the synchronization of federal efforts and is the primary point of contact for the Secretary of Homeland Security; Department of Homeland Security, *National Response Framework* (Washington, D.C.: Government Printing Office, 2008), 52. The Joint Field Office or JFO is a temporary federal facility that coordinates federal assistance activities in/near the affected jurisdiction(s) and provides a means to integrate federal resources and engage directly with the State.

cooperating due to the personal relationships of all the military commanders. The Secretary of Agriculture receives daily reports concerning the success of the quarantine and stop movement, but the reports are conflicting. The Secretary of Agriculture is contemplating pursuing his/her authority to enact “extraordinary powers.”²¹

Ultimately, the nation sustains a multi-state, multi-jurisdictional incident involving FMD but has slowly contained the disease. Subsequently, the Secretary of Agriculture is suggesting that Canada and Mexico begin the prophylaxis for FMD, mandatory vaccination. This decision is unpopular; however, because current vaccines taints the meat resulting in trading at a discount. This body is now weighing the consequence of the disease and considering the potential for FMD to be endemic to North and South America because of infected wildlife. The notional incident concludes with the potential for FMD to be endemic to North America. However, by reconciling existing tensions that are inherent with FAD outbreaks the United States can remain “FMD-Free”. Authorities must improve the nation’s preparedness and disaster planning efforts.

Part I: Current State- Why the United States is at Risk

Within the United States, few people conceptualized the danger and significance of an attack upon the agriculture industry prior to the 9/11 attacks. Indeed, a unique and lasting American narrative involves a shared expectation that our food supply will always be plentiful, accessible, inexpensive, and safe for consumption.²² However, since the 9/11 attacks, policy makers and citizens alike have begun to re-examine and challenge long held conceptualizations. For the first time in our nation’s history, many Americans have begun to contemplate their

²¹ The Secretary of Agriculture’s extraordinary powers are authorized pursuant to 21 USC §113 to halt animal exports and under 21 USC § 123 to impose quarantines on any state or territory.

²² Colonel John H. Grote Jr., *Agroterrorism: Preparedness and Response Challenges for the Departments of Defense and Army* (Masters diss., Army Environmental Policy Institute, 2007), 1.

personal safety along with the safety of the foods they consume.²³ Subsequently, the federal and state governments, in concert with industry and academia, scrutinized the geography and characteristics of the nation's critical infrastructure.²⁴ In response, lawmakers and key stakeholders in the agriculture industry introduced the term "agroterrorism" to characterize the actions of belligerents and the consequences involving a disruption of the agriculture and related food industries.

Agroterrorism

The United States government authored many definitions of "agroterrorism." This monograph will use the definition provided by the Congressional Research Service (CRS) exclusively in an effort to remain factual and consistent. The CRS defines agroterrorism as "a subset of bioterrorism, and is defined as the deliberate introduction of an animal or plant disease against livestock or into the food supply with the goal of generating fear, causing economic losses, and/or undermining stability."²⁵ Additionally, this monograph will focus on FADs and exclude zoonotic pathogens, which exceed the scope of this monograph.

Characteristics of Agroterrorism

Terrorists may conduct agroterrorism due to five unique and desirable characteristics: (1) It can threaten the security of the food supply by inducing fear and anxiety in citizens, creating severe economic damage in one industry segment, while disrupting all interconnected

²³ Ibid., 2.

²⁴ Department of Homeland Security, *National Infrastructure Protection Plan* (Washington, D.C.: Government Printing Office, 2009), 7. The Department of Homeland Security defines critical infrastructure as systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on any combination of national security, national economic security, or national public health or safety.

²⁵ Bioterrorism can be described as the use, or threatened use, of biological agents to promote or spread fear or intimidation upon an individual, a specific group, or the population as a whole for religious, political, ideological, financial, or personal purposes.

industries.²⁶ (2) Agroterrorists can easily obtain, transport, and employ FAD pathogens in contrast to weaponized pathogens engineered to harm humans.²⁷ (3) Afflicted nations cannot determine attribution because it is almost impossible to distinguish intentional outbreaks from natural outbreaks.²⁸ (4) Every incident has the potential to develop into an epidemic of national scale. (5) An incident or rumor of an incident will disrupt the national economy and potentially create lasting transformative and debilitating effects.²⁹

History of Agroterrorism

Agroterrorism is not a new phenomenon. Historically many nation states, terrorists, and criminal organizations purposefully attacked livestock, the food supply, and food industry. The Assyrians poisoned the wells of their enemies in the 6th century BCE. During the American Civil War, Union troops attacked Confederate agricultural commodities and farms. Germany experimented with and employed equine diseases in WWI. In Kenya, the Mau Mau tribe used plant toxins to kill livestock. In the 1980s, the Tamil separatist threatened to infect humans and crops with pathogens.³⁰ While the Rajneeshee cult infected salad bars with Salmonella in 1984 and sickened 751 people.³¹

²⁶ Mark G. Polyak, *The Threat of Agroterrorism: Economics of Bioterrorism*, <http://biodefense.georgetown.edu/publication/economicsofbioterrorism.pdf> (accessed on March 20, 2010).

²⁷ Joseph Foxell, Jr., *Current Trends in Agroterrorism (Antilivestock, Anticrop, and Antisoil Bioagricultural Terrorism) and Their Potential Impact on Food Security*, Studies in Conflict and Terrorism (New York: College of Staten Island, 2001), 108.

²⁸ Henry Parker, "Agricultural Bioterrorism: A Federal Strategy to Meet the Threat," National Defense University, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm (accessed November 2, 2009).

²⁹ Polyak, *The Threat of Agroterrorism: Economics of Bioterrorism*.

³⁰ William M. Simpson, MD., "Agricultural Bioterrorism," <http://www.authorstream.com/Presentation/Miguel-22130>. (accessed on 10 March 2010).

³¹ Testimony of John P O'Neil, Supervisory Special Agent, Chief, Counter Terrorism Section, Federal Bureau of Investigation, in Permanent Sub-Committee on Investigations, Committee on Governmental Affairs, United States Senate, *Global Proliferation of Weapons of Mass Destruction* (Washington, D.C.: G.P.O., 1996), 238.

Contemporary Threat of Agroterrorism

Today, Foot and Mouth Disease (FMD) is a growing threat to America's national security because of inherent vulnerabilities and the interconnectedness of the system of critical infrastructure.³² Terrorists can easily introduce FMD into a country and destabilize it by introducing fear into consumers while destroying a vital component of its economy, and reducing its ability to provide sustenance. The Government Accounting Office (GAO) reports, "the FMD virus is present in sixty percent of the countries of the world and is particularly endemic in major parts of Africa, Asia, and South America."³³ Thus, FMD is readily available to belligerents of the United States in many parts of the world.

Nexus between Agriculture and Terrorism

The 9/11 attacks awakened Americans to the realization of the persistency and extent that Islamic terrorists are willing to commit. Al Qaeda "sees violence as both acceptable and necessary, and draws no distinction between military and civilian targets for this violence."³⁴ Al Qaeda left behind many clues to their aspirations after being routed by U.S. troops in the months following the 9/11 attacks. Besides paramilitary supplies and equipment were thousands of documents and computer records, which included hundreds of pages of translated agricultural documents. Reportedly, a significant part of the group's training manual is devoted to

³² Axelrod and Cohen, *Harnessing Complexity*, 153. Axelrod and Cohen define a system as a larger collection, including one or more populations of agents and possibly artifacts.

³³ United States General Accounting Office, "Foot and Mouth Disease; To Protect U.S. Livestock, USDA Must Remain Vigilant and Resolve Outstanding Issues", Report to the Honorable Tom Daschle, U.S. Senate, (Washington D.C. July 2002)

³⁴ Stephen Biddle, "War Aims and War Termination", <http://www.carlisle.army.mil/usassi/waraims.pdf>, Internet; (accessed March 20, 2010).

agroterrorism.³⁵ Following coalition operations in both Iraq and Afghanistan, it is not surprising that Al Qaeda is considering alternative methods to attack the United States. Since meeting the terrorists' terms is unacceptable, the United States must mitigate the threat and prevent future attacks.

Threats to the Agriculture and Food Industry within the United States

For the United States, the 9/11 attacks served as the impetus to cognitively re-examine the threat: (1) its capabilities; (2) its aspirations; and (3) the length terrorists would strive to achieve it and formulate the strategy for homeland defense. Those threats can be further divided into three strategic conditions.³⁶ (1) A terrorist or terrorist group must have the ability to obtain and disseminate a pathogen. (2) The terrorist or terrorist group must be interested in sickening or killing animals or crops as a means to its goal. (3) The terrorist or terrorist group must have the desire to do so using pathogens in lieu of other tactics.

The National Institute of Justice recognizes five primary groups to be significant threats to the American agriculture industry: (1) International Terrorists; (2) Domestic Terrorists; (3) Militant Animal Rights Groups; (4) Economic Opportunists; and (5) Disgruntled Employee(s).³⁷ Individuals motivated to harm the United States will not ignore agroterrorism. Many countries possess anti-agriculture biological weapons and terrorist groups are refining their capabilities to conduct agroterrorism.³⁸ Most counterterrorist and security experts anticipate that an agroterrorist

³⁵ Barry Zellen, "Preventing Armageddon II: Confronting the Specter of Agriterror," *Strategic Insights*, Volume III (December 2004) <http://www.nps.edu/Academics/centers/ccc/people/zellen.html>. (accessed March 20, 2010)

³⁶ Richard Falkenrath, Robert Newman, and Bradley Thayer, *America's Achilles Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, Massachusetts: MIT Press, 1998), 67.

³⁷ Terry Knowles et al., *NIJ Research Report: Defining Law Enforcement's Role in Protecting American Agriculture from Agroterrorism*, <http://www.ncjrs.gov/pdffiles1/nij/grants/212280.pdf>.

³⁸ Zellen, *Preventing Armageddon II: Confronting the Specter of Agriterror*, <http://www.nps.edu/Academics/centers/ccc/people/zellen.html>.

attack will involve two distinct methodologies: (1) An intentional introduction of a FAD pathogen into the production of livestock; or (2) Directed attacks against our food production system, to make food or food product inedible or poisonous.³⁹

Unfortunately, the United States government has not authored a comprehensive national strategy to specifically combat agroterrorism.⁴⁰ The United States government must consider the potential for state sponsored attacks, and the ability of terrorists to obtain pathogens from failing countries or both. Most experts agree that the single greatest threat to our agricultural economy is Foot and Mouth Disease (FMD). An outbreak of this highly contagious viral disease would have a catastrophic effect, involving immediate cessation of beef exports, full-scale quarantines, possible destruction of millions of animals, stop-movement orders, and economic chaos.

The Implications of Phytosanitary Trade Restrictions and Barriers to Trade

The World Trade Organization's (WTO) "Agreement on the Application of Sanitary and Phytosanitary Measures" explicitly establishes standards, guidelines, and recommendations developed under the auspices of the OIE. Therefore, the WTO recognizes the OIE as the international body responsible for establishing plant and animal health standards that enable international trade, which affects export activities as well as commodity prices. Many nations do not conduct trade activities with countries with certain diseases or status (phytosanitary trade restrictions).⁴¹ The economic impact animal health can have on the livestock and related industries is realized when producers lose export markets or conduct trade with heavy

³⁹ Grote, *Agroterrorism: Preparedness and Response Challenges for the Departments of Defense and Army*, 5.

⁴⁰ Testimony of Peter Chalk, Policy Analyst, RAND Washington Office, in U.S. Congress. Senate. Oversight of Government Management, Restructuring and the District of Columbia. 107 Congress., 1st Sess., October 10, 2001.

⁴¹ Phytosanitary trade restrictions are restrictions that involve trade with the objective of preventing the introduction of quarantine pests or limit the entry of regulated non-quarantine pests with imported commodities and other regulated articles.

discounts.⁴² For example, prior to the discovery of Bovine Spongiform encephalopathy (BSE) in December 2003, the United States exported over 1 million metric tons of beef compared to only 200 thousand metric tons in 2004 following discovery of the BSE infected animal in Washington State.⁴³

Scope and Value of the United States Agriculture Industry

The agriculture and food industry are important to the stability of the United States and American identity. Currently, the United States agriculture industry provides an abundance of food for our nation as well as to others around the globe. Agricultural trade represents one of the largest surpluses of goods within the nation's gross national product.⁴⁴ In 2009, the USDA estimated the value of the United States agriculture industry at \$1.2 trillion.⁴⁵ Domestic sales accounted for \$324 billion of agricultural products in 2010 and exports accounted for \$72 billion in fiscal year 2007.⁴⁶ One of eight Americans works in an occupation directly supported by food production, which allows our citizens to enjoy the lowest food prices in the world, spending about eleven percent of disposable income in comparison to the twenty to thirty percent in many other countries.⁴⁷

⁴² Dustin Pendell, "Value of Animal Traceability Systems in Managing a Foot and Mouth Disease Outbreak in Southwest Kansas," (Ph.D. diss., Kansas State University, 2006), 1.

⁴³ Ibid., 2.

⁴⁴ Parker, *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm.

⁴⁵ United States Department of Agriculture, Economic Research Service, International Macroeconomic Data Set, under "Real GDP," <http://www.ers.usda.gov/Data/macroeconomics> (accessed on March 20, 2010)

⁴⁶ United States Department of Agriculture, Economic Research Service, International Macroeconomic Data Set, under "U.S. agricultural exports, year-to-date and current months," <http://www.ers.usda.gov/Data/FATUS> (accessed on March 20, 2010)

⁴⁷ Parker, *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm.

Interconnectedness of the Agriculture Industry

The agriculture and food industry is extremely susceptible to agroterrorist incidents because of the geographic concentration, agromovement, and the interrelationship between the agriculture industry and other segments of the nation's critical infrastructures. Twenty-four percent of total agricultural production is concentrated within the Midwest.⁴⁸ Additionally, the corn, beef and dairy segments represent the top three commodities within the entire agriculture industry.⁴⁹ These commodities account for forty percent of total cash receipts.⁵⁰ An agroterrorist can easily recognize a region's concentration of economic activity and target its production and vulnerabilities.

Figure 1 depicts the Meadows production cycle of the top three agricultural commodities and illustrates how they interact.⁵¹ A key node in this illustration is animal feed consumption.⁵² This intersection illustrates how a disruption to one segment can ultimately affect all other activities. What Figure 1 does not depict is the interaction between animal feed consumption and

⁴⁸ United States Department of Agriculture, Economic Research Service, 2007 Census of Agriculture: Economics, under "Geography of Production," http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/economics.pdf (accessed on March 20, 2010)

⁴⁹ United States Department of Agriculture, Economic Research Service, 2007 Census of Agriculture: Economics, under "Sales and Net Income," http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/economics.pdf (accessed on March 20, 2010)

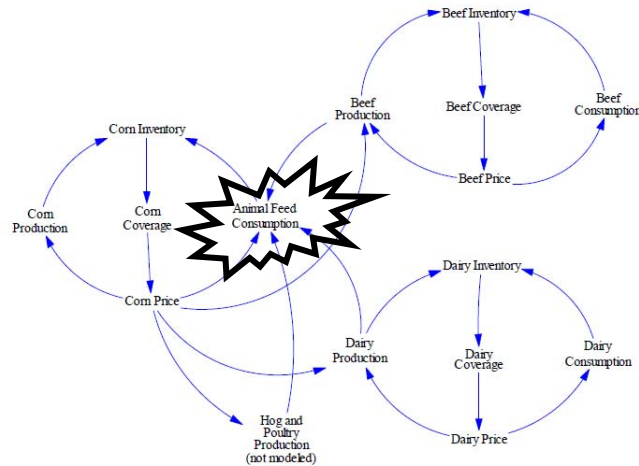
⁵⁰ Stephen H. Conrad, *The Dynamics of Agricultural Commodities and Their Responses to Disruptions of Considerable Magnitude*, Scandia National Laboratory. <http://www.sandia.gov/nisac/docs/ag%20commodities.pdf> (accessed January 2, 2010).

⁵¹ Stephen H. Conrad, *The Dynamics of Agricultural Commodities and Their Responses to Disruptions of Considerable Magnitude*, Scandia National Laboratory. <http://www.sandia.gov/nisac/docs/ag%20commodities.pdf> (accessed January 2, 2010). The Meadows commodity production cycle demonstrates the interconnected relationships and feedback process within the agriculture industry. This cycle is illustrated with the following: (1) Inventory; (2) Inventory Coverage; (3) Price; (4) Production Capacity; and (5) Consumption.

⁵² Department of Defense, *Joint Publication 5.0 – Joint Operation Planning* (Washington, D.C.: Government Printing Office, 2006), III-18. Operations defines a key node as one that is critical to the functioning of a system.

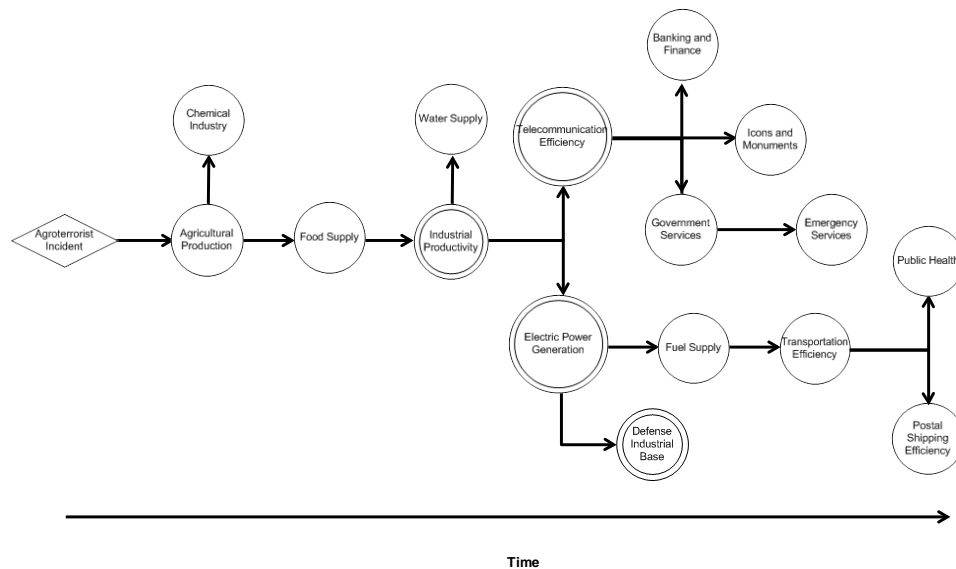
grain production. Animal feed consumption will affect the selection of crops that producers cultivate, which affect consumers. An agroterrorist incident will reverberate across the entire system of critical infrastructure, this is illustrated in Figure 2.

Figure 1-Commodity Production Cycle involving Corn, Beef, and Dairy Production



Source: Stephen H. Conrad, Sandia National Laboratory. *The Dynamics of Agricultural Commodities and Their Responses to Disruptions of Considerable Magnitude*, <http://www.sandia.gov/nisac/docs/ag%20commodities.pdf> (accessed January 2, 2010).

Figure 2-Agroterrorist incident affecting a system of critical national infrastructure



Source: Stephen H. Conrad, Sandia National Laboratory. *The Dynamics of Agricultural Commodities and Their Responses to Disruptions of Considerable Magnitude*, <http://www.sandia.gov/nisac/docs/ag%20commodities.pdf> (accessed January 2, 2010).

Characteristics of the United States Agriculture Industry

Within the United States, five facets characterize agricultural production and define the environmental frame.⁵³ These unique characteristics make the industry vulnerable to terrorism or natural outbreaks: (1) The majority of agricultural production occurs in open fields, pastures, and feedlots throughout the countryside.⁵⁴ (2) There are many nodes where livestock is concentrated and producers/agents interact.⁵⁵ (3) Agromovement, producers routinely transport and commingle animals, grain, and processed food products throughout the production chain.⁵⁶ (4)

⁵³ Department of the Army, *Field Manual 5.0 – The Operations Process* (Washington, D.C.: Government Printing Office, 2010), 3-8. The environment frame is a narrative and graphic description that captures the history, culture, current state, and future goals of relevant actors in the operational environment.

⁵⁴ Congressional Research Service, *Agroterrorism: Threats and Preparedness* (Washington D.C., G.P.O., 2004), 1.

⁵⁵ Ibid.

⁵⁶ Ibid.

Producers have large investments in their livestock herds. (5) Most first responders, producers, veterinarians, and pen riders, lack direct experience with FADs; therefore, an infection can rapidly develop into an epidemic because clinical symptoms will not be identified.⁵⁷

In the United States, cattle production is geographically dispersed and regionally concentrated.⁵⁸ In fact, the USDA reports that more than fifty percent of all cattle is produced in five states and that production is concentrated in Kansas, Texas, and Nebraska.⁵⁹ Contemporary practices and facility design also create unique problems for managing biosecurity threats. Agromovement and the concentration of livestock at key nodes create unique challenges for authorities attempting to trace and/or contain pathogens. The current environmental frame almost guarantees that FAD identification by authorities will be delayed and that the pathogen will be widespread before authorities are notified. These structural conditions must inform future FAD contingency plans and operations to avoid catastrophe.

Why FMD is such a Dangerous Pathogen

Foot and Mouth disease (FMD) is a dangerous pathogen that is ideal for agroterrorists. FMD is a highly contagious viral disease that does not affect humans directly, but affects cloven-hoofed animals such as cattle, swine, sheep, goats and wild animals such as deer. It is readily accessible, virulent, and difficult to diagnose because there are more than seventy strains and it

⁵⁷ Barry Pittman (DVM, MPH, DACVPM, Area Emergency Coordinator, Kansas/Missouri USDA, APHIS, Veterinary Services, Kansas Area Office) interview by author, Topeka, Kansas, March 2, 2010.

⁵⁸ United States Department of Agriculture, Economic Research Service, 2007 Census of Agriculture: Cattle Production, under “Total Market Value of Cattle and Calves Sold,” http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/beef_cattle.pdf (accessed on March 20, 2010)

⁵⁹ United States Department of Agriculture, Economic Research Service, 2007 Census of Agriculture: Cattle Production, under “Cattle Sales,” http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/beef_cattle.pdf (accessed on March 20, 2010)

has a short incubation time [1-12 days].⁶⁰ These characteristics allow FMD to easily create an incident of national significance due to the interconnectedness of the industry.

FMD creates the following economic effects: (1) Countries that are FMD endemic experience ten percent production losses of annual beef output and receive a fifty to sixty percent discount on beef prices.⁶¹ (2) Twenty-five percent of dairy cows suffer a two-month delay in breeding and cannot produce milk. In countries with FMD, dairies report 1,000 pounds/head of lost milk production.⁶² (3) Most producers cull thirty-three percent of their herds because of permanent mastitis. Fifty percent of the cows do not recover their normal appetite for one month, this requires producers to invest two additional months of feeding.⁶³ All of these effects increase the variable costs of production.

FMD is relatively easy to introduce into healthy herds unless strict biosecurity procedures are practiced. Once the virus is established, it can spread rapidly throughout a herd, especially if detection is slow or delayed.⁶⁴ Bruce Clements, associate director, Saint Louis University, Institute of Biosecurity, states that a FMD outbreak can spread throughout an entire state in one week.⁶⁵ Dr. R. Douglas Meckes, D.V.M., Food, Agriculture and Veterinary Defense Division, Office of Health Affairs, Department of Homeland Security, states that it is likely that an outbreak will remain undetected for about ten days before appropriate authorities are aware

⁶⁰ The Center for Food Security and Public Health, Under “Foot and Mouth Disease,” <http://www.cfsph.iastate.edu> (accessed March 2, 2010).

⁶¹ Pendell, *Value of Animal Traceability Systems in Managing a Foot and Mouth Disease Outbreak in Southwest Kansas*, 11.

⁶² Ibid.

⁶³ Ibid.

⁶⁴ Barry Pittman (DVM, MPH, DACVPM, Area Emergency Coordinator, Kansas/Missouri USDA, APHIS, Veterinary Services, Kansas Area Office) interview by author, Topeka, Kansas, March 2, 2010.

⁶⁵ Bruce Clements, “Food Supply Protection in an Age of Biocrimes, Terrorism, and Emerging Infections,” Saint Louis University Institute of Biosecurity (January 2004): 33.

through clinical and scientific diagnosis that FMD is present and spreading.⁶⁶ An outbreak involving delayed notification, exponentially increases the remediation costs due to the agromovement. Thomas McGinn DVM, Assistant State Veterinarian at the North Carolina Department of Agriculture, stated that within the United States alone, a five-day delay in identification would require the destruction of 23 million animals in fourteen states.⁶⁷

This disease is a major constraint to the international livestock trade. For example, in March 1997 authorities identified the disease in Taiwanese pigs. The disease spread throughout Taiwan in six weeks and authorities subsequently slaughtered more than eight million pigs and halted exports. Taiwanese authorities later determined a single pig imported from Hong Kong as the origin of the disease.⁶⁸ The disease is still affecting Taiwan, and the ultimate costs to that nation are estimated to be at least \$19 billion, \$4 billion to eradicate the disease and another \$15 billion in trade losses.⁶⁹

In 2002, a rumor involving FMD at the Holton Livestock Market in Kansas caused a \$50 million scare that reverberated throughout the Midwest and into the Chicago Mercantile Exchange.⁷⁰ This episode illustrates the immediate economic consequences of FMD. Kansas is a national actor in terms of agricultural production and any incident in Kansas will create ripple effects throughout the entire country.

⁶⁶ R. Douglas (Doug) Meckes (D.V.M., Food, Agriculture and Veterinary Defense Division, Office of Health Affairs, Department of Homeland Security) interview by author, teleconference, March 8, 2010.

⁶⁷ Barry Pittman (DVM, MPH, DACVPM, Area Emergency Coordinator, Kansas/Missouri USDA, APHIS, Veterinary Services, Kansas Area Office) interview by author, teleconference, November 19, 2009.

⁶⁸ Parker, *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm.

⁶⁹ Stephen Apatow, "Agricultural Security and Emergency Preparedness: Protecting One of America's Critical Infrastructures," Humanitarian Resource Institute (December 2001) under "References," <http://www.humanitarian.net/biodefense/papers/ASEP-2001-12.html> (accessed March 20, 2010).

⁷⁰ Fass Track, "Analysts Say Kansas Foot-And-Mouth Rumor Cost Industry \$50 Million," http://www.fass.org/fasstrack/news_item.asp?news_id=245 (accessed March 20, 2010).

2001 FMD Outbreak in the United Kingdom

The 2001 FMD outbreak left lasting images of acrid smoke hovering over the rolling hills of the United Kingdom (U.K.). The outbreak affected more than 9,000 farms and required the destruction of more than three million animals because the pathogen spread for nearly three weeks before authorities took any action to halt the disease.⁷¹ Subsequently, the government of the United Kingdom directed the mass slaughter and incineration of susceptible livestock across the country. Ultimately, the United Kingdom eradicated the disease by using a ring control strategy that eventually involved the Ministry of Defense.⁷² In the aftermath, the United Kingdom spent more than two years to attain “FMD-Free” status to resume international trade without caveats or discounts, while the Netherlands, France, and several countries in South America and the Middle East reported additional cases. The outbreak cost the United Kingdom government \$10 billion to eradicate, \$1.6 billion for indemnity compensation, and \$4 billion in losses to the tourism industry.⁷³ Consequently, the U.K. government scrutinized the outbreak to access the strength and weakness of their disaster response plans.⁷⁴

⁷¹ Terry Knowles et al., *NIJ Research Report: Defining Law Enforcement’s Role in Protecting American Agriculture from Agroterrorism*, <http://www.ncjrs.gov/pdffiles1/nij/grants/212280.pdf>.

⁷² Ring control strategy is the depopulation and/or vaccination of all susceptible livestock in a prescribed area or ring, around an outbreak of an infectious disease. Ring control strategy controls an outbreak by creating a series of concentric rings around infected premises that forms a buffer zone to halt the spread of a pathogen; Major Paddy Williams (At the time, Cornet P.J. Williams of the Household Cavalry Regiment, Student of the School of Advanced Military Studies (SAMS) interview by author, teleconference, March 28, 2010).

⁷³ UK Resilience, “Rural Recovery After Foot and Mouth Disease,” Under “Cabinet Office, FMD Outbreak 2001,” http://www.cabinetoffice.gov.uk/media/131570/rural_recovery_after_fm_disease.pdf (accessed March 20, 2010).

⁷⁴ Parker, *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm.

Part II: Why is Kansas Susceptible to FADs?

Kansas, the 34th state to gain admittance into the union, is located in the geographic center of the continental United States. Today, Kansas boasts a population of more than two million residents, a land mass that measures approximately 81,823 square miles, and 105 counties.⁷⁵ The agriculture and related industries contribute almost fifty percent of the annual state revenue, which is equivalent to \$14.4 billion. One of the key concerns for many Kansans is the protection of its agriculture industry from economically devastating FAD(s) such as FMD.

In agricultural terms, the state contains more than 65,500 farms and a livestock inventory that consists of: (1) 6,669,163 head of cattle; (2) 1,885,252 head of swine; and (3) 12,027 head of sheep.⁷⁶ FMD is a significant and enduring threat because Kansas is a major cattle state [ranked second nationally]. In terms of dairy production, Kansas produces over 2,415,000,000 pounds of milk from 117,000 head of cattle.⁷⁷ The dairy industry is centered in southwestern Kansas in Grant County and the industry is expected to double to 160,000 head of cattle within the decade. The USDA also reports that Ford County alone possessed a livestock inventory valued at \$386.9 million.⁷⁸ The emerging dairy and ethanol industries in Kansas are extremely vulnerable to a FMD outbreak. Figure 3 depicts the concentration of confined animal feeding facilities and

⁷⁵ Kansas Department of Transportation, Under “Quick Facts,” http://www.ksdot.org/pdf_files/QuickFacts09.pdf (accessed March 6, 2010).

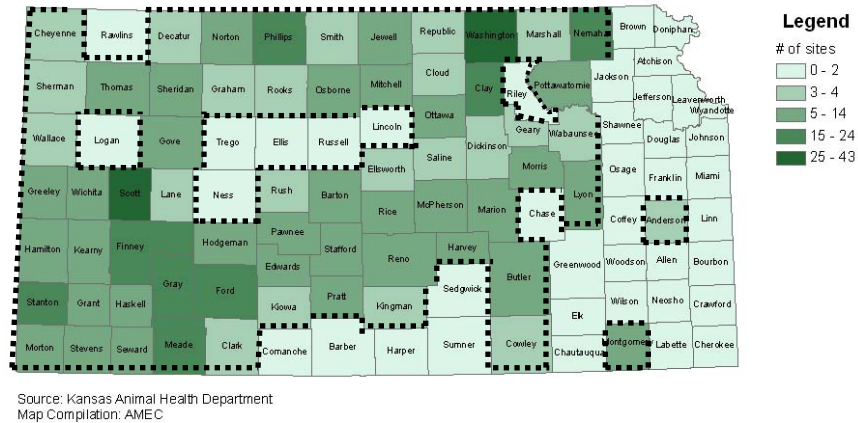
⁷⁶ United States Department of Agriculture, Economic Research Service, 2007 Census of Agriculture: Economics, under “Kansas,” http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_us_state_level/st99_2_001_001.pdf (accessed on March 20, 2010).

⁷⁷ Kansas Department of Transportation, Publications and Reports, Under “2007 Transportation Logistics & Economics of the Processed Meat and Related Industries in SW Kansas,” <http://www.ksdot.org/bureaus/burRail/rail/publications/2007economicmeat.pdf> (accessed March 10, 2010).

⁷⁸ United States Department of Agriculture, Economic Research Service, 2007 Census of Agriculture: Economics, under “Ford County Kansas,” http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Kansas/cp20057.pdf (accessed on March 20, 2010).

dependent local economies throughout Kansas. The area circumscribed by the dashed lines designates counties that are heavily dependent on the agricultural economy.

Figure 3-Confined Animal Feeding Facilities



Source: Kansas Hazard Mitigation Plan November 2007. Under "Foreign Animal Disease," http://www.kansas.gov/kdem/pdf/mitigation/Kansas_Hazard_Mitigation_Plan_2007.pdf. (accessed January 2, 2010)

The animal slaughter and meat processing industry are concentrated in southwest Kansas. The state contains 462 registered feed yards, which hold about 1.8 million head of cattle and fatten over 3.5 million per year.⁷⁹ The cattle industry also imports feeder cattle from eastern Kansas, Nebraska, Missouri, and other areas and delivers finished cattle to nearby meat plants by using tractor-trailers to transport cattle due animal health regulations as well as a proportional number of tractor-trailers hauling feed.⁸⁰ The red meat industry requires the daily movement of 400 truckloads of cattle with 40-100 head of cattle per conveyance in Kansas alone. Feed consumption also requires the daily movement of thirty-six tractor-trailers that haul 1.2 million

⁷⁹ Terry Knowles et al., *NIJ Research Report: Defining Law Enforcement's Role in Protecting American Agriculture from Agroterrorism*, <http://www.ncjrs.gov/pdffiles1/nij/grants/212280.pdf>; Kansas Department of Transportation, Publications and Reports, Under "2007 Transportation Logistics & Economics of the Processed Meat and Related Industries in SW Kansas," <http://www.ksdot.org/bureaus/burRail/rail/publications/2007economicmeat.pdf> (accessed March 10, 2010).

⁸⁰ Ibid.

pounds of feed.⁸¹ Tractor-trailers from southwest Kansas transport processed meat, meat byproducts, and other associated products to their final destinations.⁸²

Kansas has more than 5,519 roads that enter into or exit the state.⁸³ In event of a stop move order or state quarantine, personnel with legal authority and jurisdiction must operate traffic control points to close all roads that enter or exit the state at all times. Each traffic control point (TCP) requires personnel and equipment to function. Additionally, a team with the following capabilities must operate each traffic control point: (1) Personnel must have the authority to perform law enforcement duties. (2) Personnel must be trained to inspect and sample livestock. (3) Personnel must decontaminate personnel and equipment to contain and eradicate the disease. (4) Personnel must inventory and maintain articles seized for testing. (5) Personnel must have access to regional/national database to enter information that enables authorities to trace outbreaks.

This listing excludes the requirement for life-support, electrical power generation, and other necessary functions. The official after action review of the High Plains Guardian Exercise stated that the Kansas National Guard (KNG) would require up to thirty-six hours to mobilize and deploy National Guard Soldiers.⁸⁴ This does not include the time required to transport ancillary equipment to establish the quarantine. Figure 4 depicts the concentration of major roadways throughout Kansas and illustrates the difficulty and tertiary effects of disrupting interstate travel in event of a state quarantine. A stop move order or state quarantine would require significant and

⁸¹ Ibid.

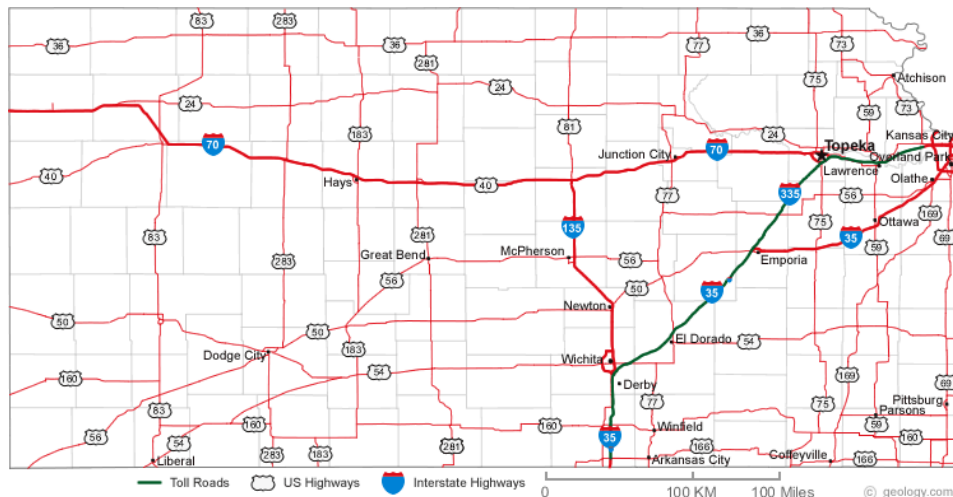
⁸² Ibid.

⁸³ Kansas National Guard, *High Plains Guardian, Military Assistance to Civil Authorities (MACA)*, http://nabc.ksu.edu/assets/uploads/HPG_AAR.pdf.

⁸⁴ Ibid.

enduring participation by law enforcement agencies, the KAHD, the KNG, FEMA, and during exigent circumstances, potentially, active duty military forces.

Figure 4-Kansas Interstate and Highway Road Map



Source: Geology. Under “Kansas Highways and Interstates,” <http://geology.com/highways/kansas.shtml> (accessed January 2, 2010).

Challenges that Will Accompany a FAD Incident

The American agriculture industry is highly distributed and geographically dispersed. Historically, this characteristic protected the industry from many FAD epidemics because interactions were limited and the movement of animals and animal products were limited and relatively inefficient. Unfortunately, the situation changed and the geographic dispersion no longer protects the industry sufficiently from the expansive and rapid movement of animals. The National Institute for Justice has coined this phenomena as agromovement. In southwest Kansas alone, hundreds of semi-trucks transport thousands of animals daily to beef processing plants. At the end of a day, hundreds of semi-trucks depart southwest Kansas with finished beef products for distribution throughout the United States and for export.⁸⁵

⁸⁵ Kansas Department of Transportation, Publications and Reports, Under “2007 Transportation Logistics & Economics of the Processed Meat and Related Industries in SW Kansas,” <http://www.ksdot.org/bureaus/burRail/rail/publications/2007economicmeat.pdf> (accessed March 10, 2010).

According to Gary Davenport, Director of Safety and Risk Management for the Kansas Motor Carrier Association (KMCA), there were 9,409 carriers and 2,805 ‘for-hire carriers’ registered in Kansas and tractor-trailers transport eighty percent of all manufactured tonnage within the state.⁸⁶ Following an agroterrorist incident, a statewide stop move order would limit income for many private carriers and for-hire carriers. The nation would also experience major delays in the movement of all commercial goods transiting through affected states. Additionally, these trucks must be decontaminated to prevent spreading the disease. The state lacks the inherent dimension to effectively conduct a stop move order and disinfect all the trucks travelling to or from an infected or quarantined state. The High Plains Guardian exercise revealed that the number of roads entering into Kansas and the quantity of animal holding areas far exceeds the state’s capabilities and this endeavor requires the active participation of all adjacent states.⁸⁷

Kansas is rapidly becoming increasingly vulnerable to an agroterrorist or natural outbreak of FMD. FMD can easily destroy vital industries and the state economy. Kansas, as well as other agricultural states, must have adequate investment and capabilities in emergency management planning and disaster response. The federal and state government must create and rehearse mechanisms that establish quarantines to prevent FMD or other FADs from spreading across the United States. For a state that contains 30,873 farming operations in comparison to 34,658 non-farming operations, it is surprising to report that Kansas employs only twenty-six full time employees, seventy part time employees and nine shared emergency coordinators across the state. Moreover, the Kansas Animal Health Department (KAHD) only has seven full time FAD diagnosticians and a cadre of on-call vets to perform diagnosis of sick animals within the state.⁸⁸

⁸⁶ Ibid.

⁸⁷ Kansas National Guard, *High Plains Guardian, Military Assistance to Civil Authorities (MACA)*, http://nabc.ksu.edu/assets/uploads/HPG_AAR.pdf.

⁸⁸ Ibid.

Part III: Are Existing Plans Adequate to the Threat of FMD?

Since the 9/11 attacks, the federal government has increased security and food inspections across the United States but agroterrorist threats are not visible in national dialogue or current anti-terrorism policies.⁸⁹ However, the DoD has conducted several simulation exercises to examine the threat and validate existing policies, which identified a number of challenges at all levels of government. Participants have gained a better understanding of the difficulty posed by FMD and other FADs, however, accurate modeling software that predicts the spread of diseases to enable authorities to designate exposed and surveillance zones still does not exist. (See Figure 6) Additionally, the United States government has not assessed the difficulty of conducting multi-agency multi-state operations that enable rapid decision-making or reconcile the authorities required to operate across a distributed geographic environment.

Post 9/11 Government Reorganization

The 9/11 attacks served as the impetus for the creation of the Department of Homeland Security (DHS). The DHS merged twenty-two federal agencies employing more than 170,000 people and is the largest reorganization of the U.S. federal government since the creation of the Department of Defense in 1947.⁹⁰ Federal funding for homeland security also increased steadily and substantially since the 9/11 attacks. In the first few months following 9/11, over \$20 billion was applied to enhance homeland security, including funds to upgrade intelligence and security, provide recovery assistance to disaster sites, help victims' families, and increase the number of

⁸⁹ Parker, *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm.

⁹⁰ Department of Homeland Security, "A Brief Documentary History of the Department of Homeland Security," http://www.dhs.gov/xlibrary/assets/brief_documentary_history_of_dhs_2001_2008.pdf (accessed March 27, 2010).

law enforcement personnel. The Food and Drug Administration (FDA) has enhanced the food screening process of imported foods, and the Department of Health and Human Services (HHS) created the Office of Public Health Preparedness to coordinate the national response to public health emergencies.⁹¹

U.S. Northern Command (USNORTHCOM)

Transformations involving the United States government were not limited to the creation of the Department of Homeland Security (DHS). On October 1, 2002, the DoD established the United States Northern Command (USNORTHCOM) to provide command and control (C2) of homeland defense activities and provide defense support of civil authorities.⁹² The assigned mission states, USNORTHCOM anticipates and conducts Homeland Defense and Civil Support operations to defend, protect, and secure the United States and its interests within the assigned area of responsibility.⁹³ When directed, USNORTHCOM's mission includes domestic disaster relief operations that occur during major disasters or when emergencies exceed the capabilities of local, state and federal agencies.

Legislation, Policies, and Gaps

Current government policy and laws do not adequately address agroterrorism, despite the current emphasis on terrorism. An agroterrorist incident will involve multiple federal and state

⁹¹ The Coalition Information Centers, "The Global War on Terrorism: The First 100 Days," Coalition Information Centers, <http://www3.cutr.usf.edu/security/documents%5CPresident%5CWar%20on%20Terror%20Report%20First%20100%20Days.pdf> (accessed March 10, 2010).

⁹² United States Northern Command, *About USNORTHCOM: U.S. Northern Command History*, http://www.northcom.mil/About/history_education/history.html (accessed March 10, 2010).

⁹³ Department of Defense, *Strategy for Homeland Defense and Civil Support*, 5. Homeland Defense (HD) is defined as the protection of United States sovereignty, territory, domestic population, and critical defense infrastructure against external threats and aggression or other threats as directed by the President; Civil Support (CS) is defined as DoD support to United States civil authorities for domestic emergencies, and for designated law enforcement and other activities.

agencies and many jurisdictions. The United States government has only taken the initial steps to begin mitigating the threat by focusing upon the Department of Homeland Security and the USDA.⁹⁴ The challenge of managing a multi-state multi-agency incident involving a dangerous pathogen and multiple jurisdictions remains largely unanswered. However, most emergency management specialists assume that the National Incident Management System⁹⁵ is adequate based upon historical experience and personal assumptions.⁹⁶

Public Health Security and Bioterrorism Preparedness and Response Act

Legislation has expanded the responsibilities of the USDA and Health and Human Services (HHS). USDA and HHS gained authority to regulate agents and toxins that pose a serious threat to public health, animals, and plants through the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The FMD virus is included in the list of regulated agents and toxins. The federal government also directed that the USDA plan for and respond to biological attack against agricultural targets. Emergency Support Function – 11 reinforced and clarified the responsibilities of the USDA and support relationships between other federal agencies pursuant to a FAD outbreak.

⁹⁴ Parker, *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*, http://www.ndu.edu/inss/McNair/mcnair65/01_toc.htm.

⁹⁵ The President of the United States of America directed in HSPD-5 that the National Incident Management System (NIMS) was the national framework that integrates emergency management preparedness and response activities for incident management. HSPD-5 standardizes the generic organizational structure for first responders and directs the use of interoperable equipment. However, FAD incidents will involve unique partnerships and organizations that are not interoperable or possess a uniform lexicon. First responders include: Law enforcement, FEMA, KAHD, APHIS, FSIS, KNG, DoD, etc.

⁹⁶ John Brogan (Emergency Management Program Specialist, FEMA Region VII) interview by author Kansas City, Missouri, March 7, 2010.

Robert T. Stafford Disaster Relief and Emergency Assistance Act

The federal government supplements state and local resources in major disasters or emergencies through the Stafford Act.⁹⁷ The Stafford Act provides two mechanisms for the declaration of either a major disaster or the declaration of an emergency.⁹⁸ However, the governor of the affected state must request a declaration from the President of the United States before any federal resources are apportioned to a state emergency.⁹⁹

The Posse Comitatus Act and the Insurrection Act

Most American citizens understand that the Posse Comitatus Act (PCA) limits the use of federal troops within the United States.¹⁰⁰ However, the Department of Defense (DoD) or the United States Army may be requested by state governors to support civil authorities during exigent circumstances. Indeed, the United States Army has a long history of providing disaster assistance to communities and disaster areas.¹⁰¹ While using the Army as a posse comitatus does not represent a Constitutional violation, there have been instances when military assistance in a domestic crisis has resulted in public condemnation.¹⁰² Therefore, the Army must establish and communicate official policies that provide definitive guidance on how the PCA regulates military

⁹⁷ Haddow and Bullock, *Introduction to emergency management*, 2d., 133.

⁹⁸ Congressional Research Service, *Robert T. Stafford Disaster Relief and Emergency Assistance Act: Legal Requirements for Federal and State Roles in Declarations of an Emergency or Major Disaster* (Washington D.C., G.P.O., 2006), 1.

⁹⁹ Haddow and Bullock, *Introduction to emergency management*, 2d., 133.

¹⁰⁰ Matt Mathews, *The Posse Comitatus Act and the United States Army: A Historical Perspective*, Global War on Terrorism Occasional Paper, 14 (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2006), 31.

¹⁰¹ James A. Wombwell, *Army Support During the Hurricane Katrina Disaster*, Occasional Paper, 29 (Fort Leavenworth, Kansas: U.S. Army Combined Arms Center Combat Studies Institute Press, 2009), 9.

¹⁰² Mathews, *The Posse Comitatus Act and the United States Army: A Historical Perspective*, 63.

activity in support of FAD outbreaks as well as conduct strategic communications that inform the affected public.

Although many citizens affected by disaster may view the PCA as a barrier slowing a necessary and legitimate response, the PCA purposefully limits the use of armed forces to enforce or assist domestic law enforcement activities. Title 10 United States Code (USC) restricts active duty military forces from performing law enforcement duties within the United States.¹⁰³ The PCA does not limit state governors from using their state's National Guard (Title 32 role) to enforce state law; however, if the National Guard is operating under federal authority or Title 10, then the constraints of the PCA apply. However, when conditions deteriorate into a state of lawlessness, insurrection, or rebellion, the President of the United States is authorized to restore public order and enforce the laws of the United States.

The Insurrection Act of 1807 governs the ability of the President of the United States to use troops to put down lawlessness, insurrection and rebellion within the United States. The act limits Presidential power by relying upon state and local governments for initial response in the event of insurrection. Therefore, the PCA and Insurrection Act limit presidential powers in a domestic law enforcement arena. The law requires conditions to amount to insurrection, domestic violence, unlawful combination, or conspiracy and does indeed allow the military to enforce laws as an exception to Posse Comitatus.¹⁰⁴

While the PCA clearly limits the use military forces within the United States, clear guidance and direction that defines the limits of their authority must be communicated. Department of Defense Directive (DODD) 5525.5 and DODD 3025.15 provide definitive guidance that governs military assistance to civil authorities. To protect American citizens in

¹⁰³ Cornell University Law School, under “Chapter 67 —Use of the Army as a Posse Comitatus”, <http://www4.law.cornell.edu/uscode/18/1385.html> (accessed on March 20, 2010).

¹⁰⁴ Cornell University Law School, under “Chapter 15—Insurrection”, <http://www4.law.cornell.edu/uscode/10/stApIch15.html> (accessed on March 20, 2010).

exigent circumstances, military capabilities and assets must be used; however, authorities must recognize the legal framework that governs the activities that military forces can perform prior to assigning missions.

Homeland Security Presidential Directives

Following the reorganization of the federal government, President George W. Bush issued a series of Homeland Security Presidential Directives (HSPDs) designed to establish homeland security policies within the United States. These directives were established to identify initial capabilities, close critical gaps, and synchronize the federal response to protect the United States from major disasters. The President of the United States established a number of HSPDs to protect the agriculture industry and the nation's critical infrastructure, and to increase the level of national preparedness.

HSPD-7 was issued by the President on December 17, 2003, to identify and prioritize United States critical infrastructure and key resources, and to provide protection for these assets from terrorist attacks.¹⁰⁵ HSPD-7 identified the agriculture industry as critical infrastructure in accordance with the Homeland Security Act of 2001 as well as designating the USDA as the sector specific agency.¹⁰⁶

HSPD-9 was issued by the President on February 3, 2004, as an enhancement to HSPD-7. The directive established a national policy to defend the agriculture and food system against

¹⁰⁵ Department of Homeland Security, Under "Homeland Security Presidential Directives," http://www.dhs.gov/xabout/laws/editorial_0607.shtm (accessed March 10, 2010).

¹⁰⁶ Department of Homeland Security, *National Infrastructure Protection Plan* (Washington, D.C.: Government Printing Office, 2009), 18. The Department of Homeland Security defines Sector-Specific Agency, as a federal department or agency responsible for infrastructure protection activities in a designated critical infrastructure sector or key resources category.

terrorist attacks, major disasters, and other emergencies. Specifically, HSPD-9 outlines goals and assigns lead and supporting roles to agencies to achieve these goals. (See Figure #5) There are seven categories outlined in HSPD-9: (1) Awareness and Warning; (2) Vulnerability Assessments; (3) Mitigation Strategies; (4) Response Planning and Recovery; (5) Outreach and Professional Development; (6) Research and Development; and (7) Budget.

HSPD-9 directs the Secretary of Homeland Security to coordinate the overall national effort to protect the American agriculture industry. Under HSPD-9, DHS is responsible to oversee a national biological surveillance system (BioShield) that will combine surveillance information, collected from several agencies, with threat and intelligence information to allow DHS to characterize threats more quickly. Currently, the United States government invested \$450 million into BioShield.

The Secretary of Homeland Security was directed to work with private sector entities to establish an effective information sharing and analysis mechanism to protect the agriculture and food systems.¹⁰⁷ HSPD-9 directed the creation of a National Veterinary Stockpile (NVS), which shall “contain sufficient amounts of animal vaccine, antiviral, or therapeutic products in order to appropriately respond to the most damaging animal diseases affecting human health and the economy and that will be capable of deployment within twenty-four hours of an outbreak. The NVS shall leverage where appropriate the mechanisms and infrastructure that have been developed for the management, storage, and distribution of the Strategic National Stockpile.”¹⁰⁸



Figure 5- Roles and Responsibilities of Federal Agencies assigned in HSPD-9

¹⁰⁷ Department of Homeland Security, Under “Homeland Security Presidential Directives,” http://www.dhs.gov/xabout/laws/editorial_0607.shtm (accessed March 10, 2010).

¹⁰⁸ Ibid.

Agroterrorism attack

Agency responsibility		Prevention and preparation					Response and Recovery					Agency responsibility
		DHS	USDA	HHS	EPA	Other Federal	DHS	USDA	HHS	EPA	Other Federal	
Awareness and Warning	Monitoring and surveillance											Ensure adequate local response capability
	Intelligence and analysis											Develop agriculture component for National Response Plan
	Threat awareness											Enhance agriculture recovery systems
Vulnerability Assessments	Expand and conduct vulnerability assessments											
Mitigation Strategies	Develop and implement strategies											Study development and use of financial risk management tools encourage self-protections for vulnerable agricultural food enterprise
	Expand screening procedures											
Outreach and professional development	Information sharing and analysis											
	Higher education programs											
Research and development	Specialized training											Develop a national veterinary stockpile
	Develop disease countermeasures											Develop a national plant disease recovery system
	Develop plan to provide secure diagnostic and research laboratories											
	Establish university centers of excellence											

 Lead agency responsibility
 Secondary agency responsibility

Source: Government Accounting Office (GAO): Homeland Security: Much is being Done to Protect Agriculture from a Terrorist Attack, but Important Challenges Remain. Under "Federal Roles and Responsibilities as Defined by HSPD-9," <http://www.gao.gov/new.items/d05214.pdf> (accessed January 2, 2010).

Presidential Decision Directive (PDD) 39 and PDD 62, issued by the President on February 3, 2004, created the impetus within the United States government, to establish an interagency Contingency Operation (CONPLAN), which outlined a unified, multi-agency organized federal response. Unfortunately, the CONOP failed to address the role of key stakeholders, which include laborers, producers, veterinarians, feeders, packers, extension agents, aerial/ground applicators, transportation, cooperatives, retailers, wholesalers, and law enforcement organizations. Subsequently, the International Association of Chiefs of Police (IACP) released a report on May 17, 2005, stating that the nation's current homeland security was

“fundamentally flawed” for failing to incorporate the advice, expertise, or consent of state, tribal, and local public safety organizations.¹⁰⁹

National Response Framework

To manage disasters, the United States updated the National Response Plan following Hurricane Katrina with the National Response Framework (NRF) and suite of Emergency Support Functions (ESF). A FMD outbreak in America would activate ESF 11 – Agriculture and Food Supply. ESF #11 specifically addresses the protection of agriculture and natural resources and is coordinated by the USDA. Additionally, the DoD has signed a memorandum of agreement between the DoD and USDA, which assures military support when requested.

Emergency Support Function- Agriculture and Food Supply.

ESF #11 is divided into four primary functions. (1) The USDA’s Food and Nutrition Service (FNS) determines and coordinates nutrition assistance. (2) The USDA’s APHIS ensures that animal, veterinary, and wildlife issues in natural disasters are supported in coordination with the emergency support function that covers public health and medical services. (3) The USDA’s Food Safety and Inspection Service (FSIS) is responsible for the assurance of the safety and security of the commercial food supply. (4) The United States Department of the Interior’s Office of Environmental Policy and Compliance ensures the protection of natural, cultural, and historic (NCH) properties.

Federal Authority

The Secretary of Agriculture has broad authority to eradicate any FAD outbreaks. The Secretary may stop the importation of animals and animal products from suspected countries

¹⁰⁹ Terry Knowles et al., *NIJ Research Report: Defining Law Enforcement’s Role in Protecting American Agriculture from Agroterrorism*, <http://www.ncjrs.gov/pdffiles1/nij/grants/212280.pdf>.

pursuant to (21 USC §§101 and 111). The Secretary is authorized to order the following measures if a FAD is discovered within the United States. (1) Stop U.S. animal exports (21 USC §113) and interstate transport of diseased animals (21 USC §115). (2) Impose quarantines on any state or territory (21 USC § 123). (3) Seize and dispose of infected livestock and prevent dissemination of the disease (21 USC §134a). (4) Declare an extraordinary emergency on confirmation of a foreign animal disease diagnosis (21 USC § 134a). (5) Compensate owners for the fair market value of animals destroyed by the Secretary's orders (21 USC § 134a(d)). (6) Transfer the necessary funding from USDA's Commodity Credit Corporation to cover costs of eradication and quarantine operations (7 USC § 147b).¹¹⁰

State Authority

Kansas has a number of programs and laws to support authorities to eradicate FADs throughout the state. The Kansas Animal Health Department (KAHD) manages all aspects of this program, which involve animal identification, quarantine authority, market regulation and control of all infectious and contagious disease in livestock.¹¹¹ The state legislature has codified a number of laws to grant authority to state officials to make decisions and suggest remediation procedures to the governor.¹¹² The state livestock commissioner has the authority to eradicate FAD(s). A quarantine effort involves the active participation of the state governor, the county livestock commissioners, affected producers, and local law enforcement agencies.

Kansas statutes mandate the following: (1) Producers must immediately report suspected FADs to the livestock commissioner (K.S.A. 47-622). (2) The livestock commissioner is

¹¹⁰ United States Department of Agriculture, under "Code of Federal Regulations", <http://frwebgate6.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=96026787347+2+2+0&WASAction=retrieve> (accessed on March 20, 2010).

¹¹¹ Kansas Animal Health Department, under "Emergency Planning", http://www.kansas.gov/kaht/emergency/emergency_planning.shtml (accessed on March 20, 2010).

¹¹² Kansas Animal Health Department, under "Laws and Regulations", <http://www.kansas.gov/kaht/laws> (accessed on March 20, 2010).

authorized to impose quarantines and halt animal imports/exports into the state (K.S.A. 47-611 and K.S.A. 47-613). (3) The livestock commissioner is authorized to seize and dispose of infected livestock to prevent dissemination of the disease (K.S.A. 47-612). (4) The livestock commissioner is authorized condemn affected animals and order mass euthanasia to protect uninfected animals (K.S.A. 47-614). (5) The livestock commissioner is authorized compensate owners for the fair market value of animals destroyed by the commissioner's orders (K.S.A. 47-615). (6) The state legislature recognizes a right to indemnity for owners affected by the livestock commissioner's directives (K.S.A. 47-616). (7) The livestock commissioner is authorized to direct law enforcement officials to arrest and prosecute persons who violate the quarantine directive (K.S.A. 47-618).

Coordinated Federal and State Response to a FMD incident

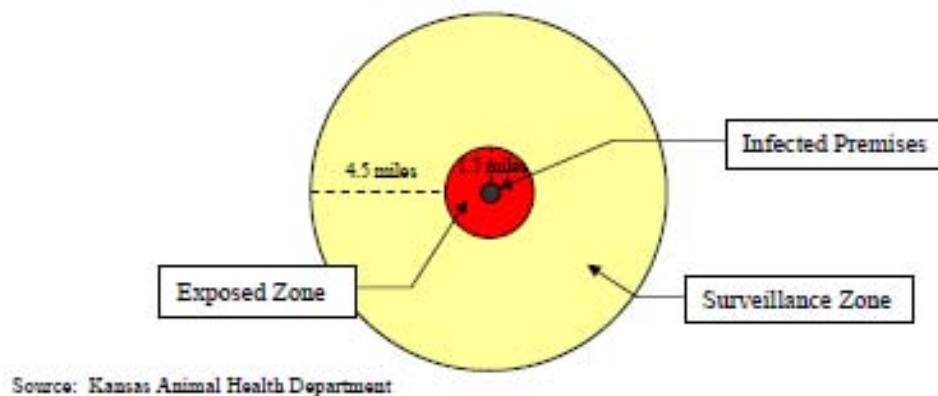
Responding to disaster events is the most visible activity that any government or emergency management organization conducts. The USDA and APHIS state that the policy of the United States is to eradicate animals infected with FMD to protect the long-term health and profitability of United States and the agriculture industry.¹¹³ A FAD incident would involve multiple federal and state agents and jurisdictions. Additionally, federal and state governments must acknowledge the crucial role of law enforcement. "Most law enforcement and industry experts agree that law enforcement resources would be pushed to the limit in response to an outbreak. Unlike responses to traditional criminal activities, a FAD outbreak would likely require

¹¹³ United States Department of Agriculture, Animal Plant Health Inspection Services, Veterinary Services under "APHIS Factsheets", http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_emer_response_fmd_07.pdf (accessed on March 20, 2010).

various segments of law enforcement organizations to remain on-site for sixty days or more to enforce quarantines and stop-movement orders.”¹¹⁴

The first priority for local law enforcement would be to establish, enforce, and maintain a strict quarantine area around the infected premise, as defined by animal health officials. In general, the quarantine area would be a six-mile radius surrounding the point of origin or detection.¹¹⁵ All vehicles, equipment, people and livestock must be prevented from leaving this quarantine area without detailed decontamination and authorization.

Figure 6-Graphic Depiction of Internationally Approved Quarantine Zones



The quarantine is a series of concentric rings that surround the infected premises. (See Figure 6) Inside the quarantine area, an “*exposed zone*” would be established in which all animals would be destroyed. The exposed zone is generally a 1.5-mile radius around the infected

¹¹⁴ Terry Knowles et al., *NIJ Research Report: Defining Law Enforcement’s Role in Protecting American Agriculture from Agroterrorism*, <http://www.ncjrs.gov/pdffiles1/nij/grants/212280.pdf>.

¹¹⁵ Barry Pittman (DVM, MPH, DACVPM, Area Emergency Coordinator, Kansas/Missouri USDA, APHIS, Veterinary Services, Kansas Area Office) interview by author, Topeka, Kansas, March 2, 2010. The Office de Internationale Epizootics (OIE) now known as the World Organization for Animal Health established a 10 km zone for compartmentalization and regionalization zoning restrictions. This is an internationally accepted figure for containing FMD. Unfortunately, this figure is insufficient for the geographic distribution of the United States agriculture industry.

premises or detection site.¹¹⁶ Law enforcement's second priority would be to implement a statewide stop-movement order issued by the livestock commissioner. "This task, to be coordinated by the state highway patrol, would involve a series of roadblocks on all highways coming into the state. Agricultural trucks, trailers, and equipment must be stopped, inspected, and decontaminated to halt the spreading of the virus."¹¹⁷ Trucks carrying livestock will not be allowed into the state.

This directive is a daunting and almost impossible task for law enforcement because stopping every cattle truck would involve a number of possibilities.¹¹⁸ (1) Diversion to a temporary holding area. (2) Potentially allowing the truck to proceed to its intended destination. (3) Returning to its point of origin. The discretion of these options would depend upon the disease risk presented by each livestock truck. The quarantines and stop-movement orders would present challenges unique from traditional law enforcement roles. Law enforcement's duties and responsibilities are twofold: prevention and emergency response. The table below identifies the major duties that law enforcement officials must perform while responding to an agroterrorist incident or natural outbreak.

¹¹⁶ Terry Knowles et al., *NIJ Research Report: Defining Law Enforcement's Role in Protecting American Agriculture from Agroterrorism*, <http://www.ncjrs.gov/pdffiles1/nij/grants/212280.pdf>.

¹¹⁷ Ibid.

¹¹⁸ Ibid.

Figure 7-Duties and Responsibilities of Law Enforcement pursuant to FMD/FAD

Prevention	Response
Identify the threats to the local agricultural industry	Implement local emergency response plan
Conduct vulnerability assessment of potential targets	Perform operations in concert with all responding agencies and agents
Develop new partnerships with health officials and industry personnel	Be prepared to conduct crime scene management
Establish an awareness and criminal intelligence database for terrorists and terrorist groups [including eco-terrorists]	Enforcement of the quarantine plan ordered by the livestock commissioner, governor, or secretary of agriculture
Develop a community policing strategy for the local livestock industry	Conduct a full scale criminal investigation to identify/apprehend/prosecute suspects
Perform reconnaissance to determine suitability of potential holding areas and traffic spillways	Perform conflict resolution such as civil unrest, breakdown of civil services, emotional stress, and
	Mann animal holding areas

Source: National Institute justice (NIJ). *Research Report: Defining Law Enforcement's Role in Protecting American Agriculture from Agroterrorism*: Duties and Responsibilities of law enforcement pursuant to a FMD/FAD incident.

The quarantines and stop-movement orders create unique challenges, which require specialized training. These requirements would severely tax available resources and potentially limit the availability of law enforcement especially in small counties. Currently, the law enforcement community and Soldiers (Regular and National Guard) require specialized training to provide effective support during a stop-movement order. The quarantine would require the coordination of vast resources (personnel, material, and equipment) and centralized command and control (C2) equipment and authority. All holding areas would require fresh water, feed, and waste management for livestock as well as the personnel manning the site. This in turn requires heavy equipment and heavy equipment operators. The site requires life support and the personnel operating the site require specific authorities or capabilities, such as law enforcement, information management, and clinical diagnosis.

The Congressional Research Service asserts, “the isolation, control, and eradication of an epidemic are the most intensive of response efforts. The exact methods for control and

eradication operations are difficult to predict. However, experience and simulations have shown that day-to-day decisions would involve “decision support templates” that include factors such as the geographical spread, rates of infestation, available personnel, public sentiment, and industry cooperation.”¹¹⁹ Finally, the control measures and costs are proportional to the geographic distribution of any FAD outbreak. Many epidemics, such as FMD, require the purposeful destruction of livestock to protect uninfected animals as well as accompanying export trade activity. Mass eradication is also politically sensitive due to resistance from groups opposed to the depopulation of animals, citizens concerned about the environmental impacts, or from producers who fear insolvency.

Finally, recovery procedures are a complex set of issues and decisions that must be made by government, industry, and communities. The goal of recovery is the implementation of a multi-tiered strategy that will rebuild the disaster-affected area safer and more securely as quickly as possible.¹²⁰ The recovery process requires balancing the need for normalcy with the long term goal of mitigating future vulnerabilities. Additionally, long-term economic recovery includes resuming the husbandry of animals and plants in the affected areas, introducing new genetic traits that may be necessary in response to the pest or disease, rebuilding confidence in domestic markets, and regaining international market share. Confidence in food markets, by both domestic and international customers, depends on continuing surveillance after the threat is controlled or eradicated.

Communication and education programs would need to inform growers directly affected by the outbreak, and inform consumers about the source and safety of their food. If eradication of

¹¹⁹ Department of the Army, *Field Manual 5.0 – The Operations Process* (Washington, D.C.: Government Printing Office, 2010), 5-4. The decision support template depicts decision points, timelines associated with movement of forces and the flow of the operation, and other key items of information required to execute a specific friendly course of action; Congressional Research Service, *Agroterrorism: Options in Congress* (Washington D.C., G.P.O., 2002), 9.

¹²⁰ Haddow and Bullock, *Introduction to emergency management*, 2d., 131.

the pest or disease is not possible, an endemic infestation would result in lower commodity prices. Resources would be devoted to acquiring plant varieties with resistance characteristics and breeds of animals more suitable to the new environment.

Military Support to a FAD Outbreak in America

The DoD is a signatory to a memorandum of agreement (MOA) among the following parties: (1) USDA; (2) APHIS; and (3) DoD. This MOA specifies that when requested, the DoD will support the USDA or APHIS in event of a FAD outbreak. The following tasks are identified as potential military support roles or activities determined by the MOA: (1) Epidemiology, Surveillance and Tracing; (2) Laboratory Diagnostic Capability; (3) Training; (4) Transportation and Installation Support; (5) Public Affairs and Communications Support; (6) Debris Removal and Disposal; (7) Depopulation and Disposal; (8) Decontamination; (9) Field Operations; and (10) DoD Veterinary Liaison Officer and DoD Veterinary Support Officer responsibilities.¹²¹

Military support will be governed by the expansiveness of an outbreak. However, authorities must reconcile existing statutes with the immediacy of desired military activity to achieve effective solutions. Therefore, active and reserve military forces must understand the obligations of military support between the affected citizens, state agents, USDA, and APHIS. Furthermore, federal and state authorities must recognize and understand the limitations placed upon active duty military forces and assign authorized mission sets to apportioned forces.

Part IV – Recommendations to Increase the Preparedness

The United States government must communicate a national response plan that will reconcile the challenges of FADs. FAD responses must equal the challenges posed by geography,

¹²¹ Memorandum of Agreement between the U.S. Department of Defense and the U.S. Department of Agriculture, 2006, Concerning Response to Animal Diseases, Washington D.C.

statute, and international sterilization protocols. Any FAD strategy will be challenged by timely response. Unfortunately, disaster management specialists do not share a cognitive understanding or conceptualization of the national FAD plan.¹²² This current situation is not satisfactory and the United States government must take action to rectify the situation.

Responding actors must act quickly and make timely decisions to contain and eradicate dangerous pathogens. The existing National Response Framework (NRF), Emergency Support Function (ESF), Emergency Management Assistance Compacts (EMAC), and National Incident Management System (NIMS), do not adequately address the difficulty posed by a FMD outbreak.¹²³

Several existing tensions limit the nation's preparedness that authorities must recognize in current disaster planning and response efforts. These tensions are listed below and will be expanded upon. (1) Conflicting perspectives hamper the effective coordination of resources and activities. (2) Common shared understanding is lacking among responding federal and state agents. (3) Stop-movement order(s) require the active participation and cooperation of all

¹²² R. Douglas (Doug) Meckes (D.V.M., Food, Agriculture and Veterinary Defense Division, Office of Health Affairs, Department of Homeland Security) interview by author, teleconference, March 8, 2010.

¹²³ Department of Homeland Security, *National Response Framework* (Washington, D.C.: Government Printing Office, 2008), 3. The National Response Framework (NRF) is a guide to how the nation conducts all-hazards response and links all levels of government, nongovernment organizations, and the private sector to provide scalable, flexible, and adaptable coordinating structures to align key roles and responsibilities. See NRF Resource Center, <http://www.fema.gov/NRF>; Department of Homeland Security, *National Response Framework* (Washington, D.C.: Government Printing Office, 2008), 4. The Emergency Support Function (ESF) group federal resources and capabilities into functional areas and structures to coordinate a national response. See NRF Resource Center, <http://www.fema.gov/pdf/emergency/nrf/nrf-esf-intro.pdf>; Department of Homeland Security, *National Response Framework* (Washington, D.C.: Government Printing Office, 2008), 6. Emergency Management Assistance Compact provides mutual aid and assistance agreements between states and/or assistance from the federal government. When a state anticipates that its resources may be exceeded, the EMAC is used to request necessary assets from other states. See NRF Resource Center, <http://www.fema.gov/NRF>; Department of Homeland Security, *National Response Framework* (Washington, D.C.: Government Printing Office, 2008), 4. The National Incident Management System (NIMS) provides standard command and management structures that apply to response activities. This system provides a consistent, nationwide template to enable federal, state, tribal, and local governments, the private sector, and NGOs to operate together in response to disasters. See NRF Resource Center, <http://www.fema.gov/NRF>

neighboring states and affected persons to be successful. (4) The detection, identification, and diagnosis of pathogens must occur with alacrity or the operational environment conditions will quickly transmit a pathogen beyond the capabilities of a state and/or regional agents. (5) Unity of command is essential to synchronize the response efforts, strategic communications, and recovery efforts between affected citizens and responding agents. The author posits that a common shared understanding of the operational environment and pathogen does not inform current FAD planning efforts. Additionally, current plans do not address or reconcile conflicting perspectives or foster the efficient exchange of information within a population of agents.

Conflicting Prospective(s) between Federal, State, and Local Authorities

Emergency management planning and disaster relief operations are artifacts of federal, state, and local jurisdictions that involve federal and state populations of agents.¹²⁴ Additionally, inaccurate assumptions and a poor conceptualization of the operational environment informs current FAD planning. It is imperative that the United States government reconcile the existing differences between federal and state authorities, specifically, the stop move decision. This decision is linked to several agents and governing bodies. First, state officials are reluctant to direct a stop move order based upon presumptive diagnosis due to unfunded realized costs subsequent to a false diagnosis.¹²⁵ Second, adjacent states must cooperate by deploying their law enforcement officials along the shared border. However, the federal government does not provide indemnities or incentives for states to perform pre-emptive decisions or stop move orders. Therefore, states must fund the entire operation unless the President declares the epidemic a federal disaster that activates provisions of the Stafford Act.

¹²⁴ Axelrod and Cohen, *Harnessing Complexity*, 153. Axelrod and Cohen define an artifact as a material resource that has definite locations and can respond to the actions of agents; Grote, *Agroterrorism: Preparedness and Response Challenges for the Departments of Defense and Army*, 16.

¹²⁵ Kansas National Guard, *High Plains Guardian, Military Assistance to Civil Authorities (MACA)*, http://nabc.ksu.edu/assets/uploads/HPG_AAR.pdf.

Common Shared Understanding and Stop Move Orders

The author posits that agromovement and delayed identification create conditions that exceed current disaster planning capabilities or ring control strategies. The author was unable to locate a consistent or universally accepted epidemiological disease model to enable authorities to perform rapid decision making, which enables authorities to contain FMD or other FAD pathogens.¹²⁶ Furthermore, scientific research has not provided a common understanding of the disease or agromovement that enables authorities to conduct accurate disaster planning or response. The author posits that FAD planning requires new cognitive scales.

A statewide stop move is mandatory for every outbreak to protect the industry, adjacent states, and the country. However, an examination of national and state FAD documents has identified a fundamentally flawed construct. All disaster-planning documents use the OIE mandated ten-kilometer ring control strategy to eradicate FMD; however, this distance is insufficient due to contemporary production practices within the United States. Scientific research indicates that by increasing the radius of the designated infected area from ten to twenty kilometers and the designated surveillance zone from twenty to forty kilometers would result in a forty-eight percent reduction in size of the epidemic.¹²⁷ Additionally, “simulations for vaccination within a radius of twenty-five or fifty kilometers yielded epidemics that were significantly smaller in size than those for vaccination within a radius of five or ten kilometers.”¹²⁸ Although this change is attractive from an epidemiological perspective, doubling the radius of the infected zone and surveillance zone would resonate negatively with producers and states.

¹²⁶ Thomas W. Bates, Mark C. Thurmond, and Tim E. Carpenter, “Results of epidemic simulation modeling to evaluate strategies to control an outbreak of foot and mouth disease,” *American Journal of Veterinary Research* (February 2003) under “AVMA Collections,” http://www.avma.org/avmacollections/disaster/ajvr_64_2_195.pdf (accessed March 20, 2010).

¹²⁷ Ibid.

¹²⁸ Ibid.

The tension primarily involves indemnities and resources. Depopulation efforts are political and fiscally constrained; the federal government must eliminate this tension by providing funding that incentivizes states to modify their ring control strategies, seek vaccination, and remove state barriers to pre-emptive diagnosis decision-making. Alleviating this tension would result in timeliness and improve the potential for successful compartmentalization or regionalization. Finally, preemptive herd slaughter strategies resulted in fewer herds becoming infected compared to baseline strategies. Depopulation in general herd sizes costs \$5.2 million to perform, in contrast, synthetic vaccination requires \$6.6 million or \$2,960 per head of cattle.¹²⁹ However, despite an incremental cost increase, vaccination eliminates carcass disposal, and other intangible benefits for producers and consumers.

FAD Detection, Identification, Diagnosis

The ability to detect a FAD is the critical lynchpin that drives all tertiary actions. The United States government and the industry must recognize the friction and potential for failure within the current methodology. Producers, veterinarians, and pen riders must receive additional FAD training to increase the cognitive FAD experience level of first responders to enable the diagnosis of clinical symptoms early. National policy requires a FAD diagnostician to submit samples to Plum Island Animal Disease Center located in New York for definitive polymerase chain reaction (PCR) testing.¹³⁰ This requires authorities to transport samples from the infected premises to Plum Island. Therefore, unless authorities are prepared to perform pre-emptive diagnostic decision-making, authorities will wait for definitive diagnoses and delay response activities. The government must increase the timeliness of the diagnosis. The author posits that

¹²⁹ American Veterinary Medical Association, under “JAVMA News - Ruminants”, <http://www.avma.org/onlnews/javma/jul03/030701c.asp> (accessed on March 20, 2010).

¹³⁰ Craig Beardsley (MS, Program Administrator, National Agricultural Biosecurity Center, Kansas State University,) teleconference by author, Leavenworth, Kansas, March 15, 2010.

regional laboratories or the Weapons of Mass Destruction (WMD) Civil Support Team (CST) possess the capabilities to perform pre-emptive diagnoses, which enables state authorities to make decisions. Currently, federal directives prevent WMD-CST emergency responders from performing any agricultural testing.¹³¹

Unity of Command

Current disaster plans rely upon state governments and various agents to coalesce when responding to a FAD outbreak. This situation is quite analogous to the conduct of multinational operations. Presently, state FAD plans create tension by attempting to achieve unity of effort, unity of command, or unity of action by disparate actors who reside geographically dispersed, possess inoperable equipment and databases, and who pursue agency specific goals. A FMD outbreak will demonstrate the inherent complexity and difficulty to create an effective command and control (C2) structure among the various agents that respond. Furthermore, these actors will be operating under unfamiliar C2 structures and personnel when responding to a FAD especially when multi-jurisdictions are involved because state simulations did not involve adjacent states.

The structural conditions of federal and state responses, create additional challenges because response planning does not reflect changes within the operational environment. A FAD incident would involve multiple federal and state agents and jurisdictions. Monolithic structures and centralized decision-making authorities are false conceptualizations of organizational structure.

To achieve an effective and timely response strategy, the United States government must immediately establish a multi-agency, multi-state command and control structure when a FAD or agroterrorist incident is suspected or present. This organization must be able to operate across state jurisdictions and establish unity of purpose and action across the affected territories and

¹³¹ Ibid.

amongst the population of agents. Next, common shared understanding leads to a timely response and remediation campaign. FAD response plans must be consistent and universal across the country to enable a timely response. The next challenge is unity of command and a mechanism to perform executive decision making to direct and control the response. A parallel command structure operating with uniform FAD response plans provides the best command and control structure.

To establish this structure, all states adjacent to a state containing an FAD incident would activate their emergency operating centers and law enforcement forces to contain the incident and execute a stop-move order. This structure would then work in conjunction with APHIS (vertically) and state emergency management agencies (horizontally). This structure will unify the response across many jurisdictions and provide a mechanism that coordinates and synchronizes their activities. Finally, this command structure provides a complexity and cohesiveness sufficient to the outbreak because it increases the timeliness of response, enhances existing EMACs, and enables coherent decision-making.

In order for this structure to function effectively, there must be an educated body present to develop respect, rapport, and understanding at all levels within the multiagency, multistate C2 structure. This is accomplished by created a mechanism to involve the federal and state agents to inform the parallel command system. Finally, iterative training events at federal, state, and local levels will contribute to the overall body of knowledge present and inform future actions. Finally, any response to a FAD requires an exclusive lexicon and interoperable equipment that leads to the effective flow of information. These variables are critical to ameliorate the tension posed by an event of national significance.

Conclusions

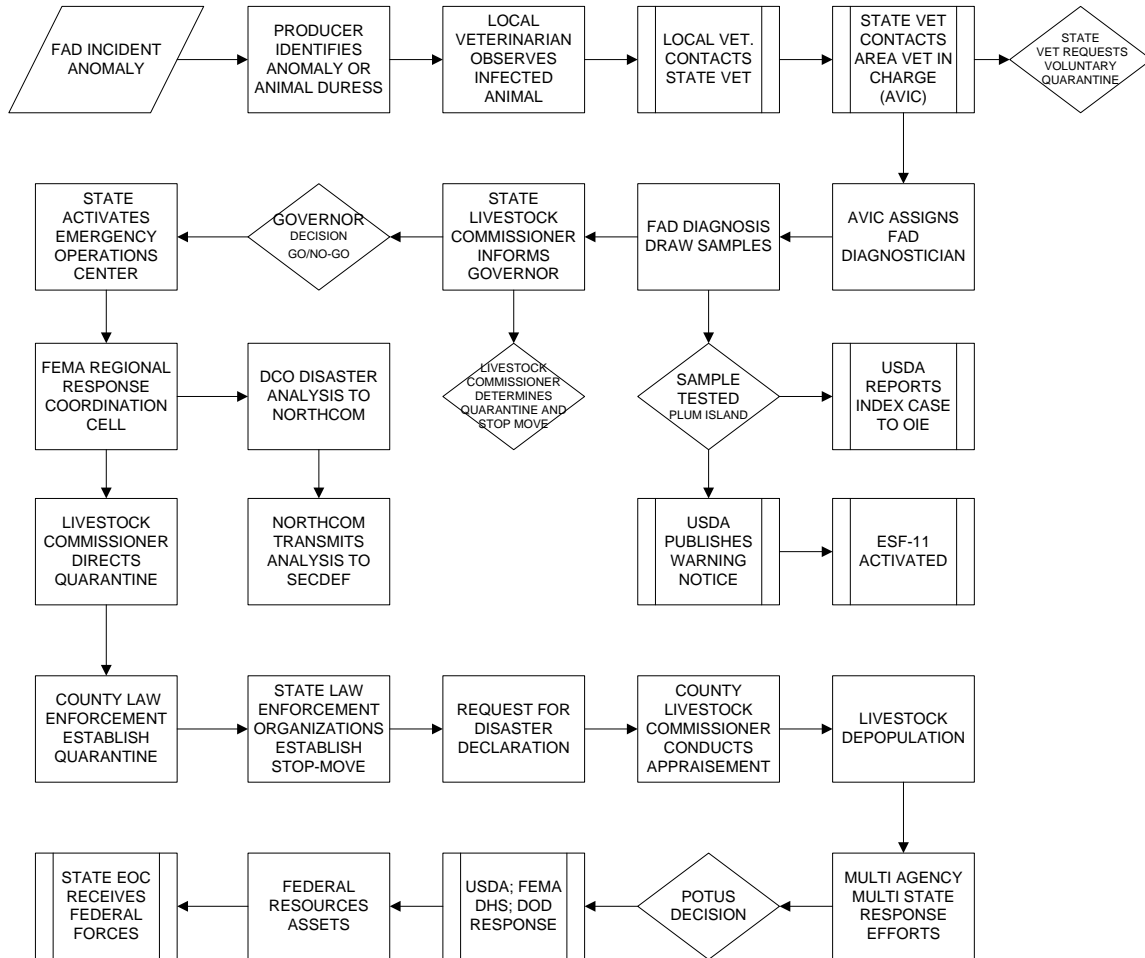
Throughout human history, there have been many threats to the security of nations. These threats have brought about large-scale loss of life, the destruction of property, widespread illness

and injury, and devastating economic loss. However, despite all that has been done by the United States government and agriculture industry, the vast majority of American agricultural and food systems industries remain susceptible to a terrorist attack or to natural disaster. The American agriculture and food industries are vitally important to the social, economic, and political stability of the United States and we must enact robust mitigation measures to secure the industry from harm.

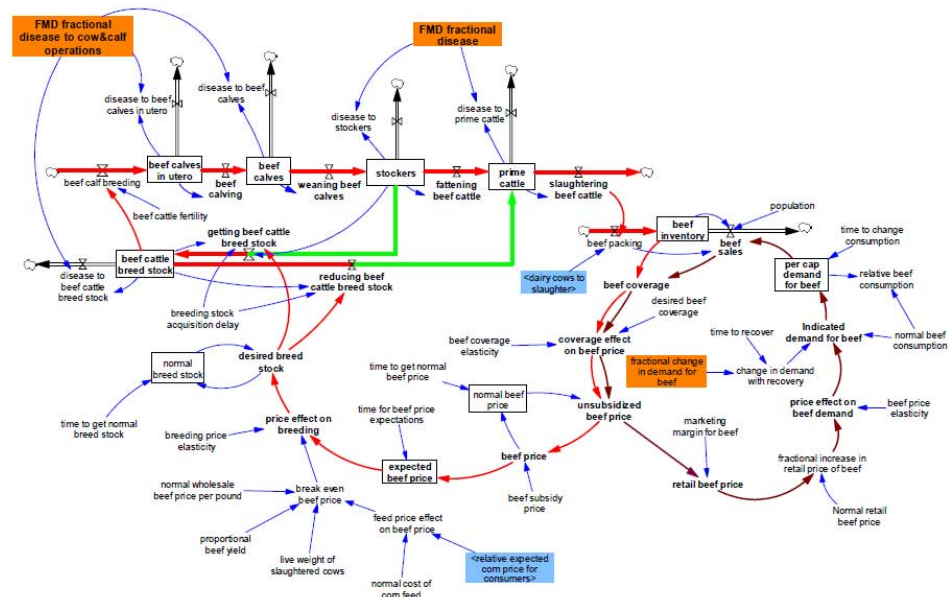
The United States faces a host of threats to its national security from diverse, nontraditional, unpredictable, and potentially covert sources. A few hostile nation states and terrorist groups represent a spectrum of threats that endanger a wide range of military and civilian targets due to religious fundamentalism or failed policies. Those groups will not overlook an agroterrorist attack as a method to achieve their goals or interests. Terrorism, directed against the food and agriculture industry and associated infrastructure, would be devastating because American farms, food, and agriculture systems are exceedingly vulnerable to the deliberate introduction of virulent pathogens. Terrorists have the motivation and technology to damage a vital section of the United States economy.

Finally, the Hurricane Katrina response characterized the public's unrealistically high expectations of the federal and state governments' role and capacity during disaster relief operations. The federal government is expected by many not only to make no errors, but also to be virtually omniscient and omnipotent in an incident of national significance. Current policies are inadequate to address agroterrorism attacks. The country must revise legislation and policies to defeat an enemy intent on attacking the agriculture industry. A comprehensive policy of prevention, detection, mitigation, and crisis elimination will neutralize the agroterrorist threat. Additionally, countries with agrarian based economies will seek assistance and leadership from America further increasing American influence in the world and create additional allies in the global struggle against terrorism.

APPENDIX A: Agriculture Event Response Protocol



APPENDIX B: Interactions FMD creates within the Cattle Industry



Source: Stephen H. Conrad, Sandia National Laboratory. *The Dynamics of Agricultural Commodities and Their Responses to Disruptions of Considerable Magnitude*, <http://www.sandia.gov/nisac/docs/ag%20commodities.pdf> (accessed January 2, 2010).

This illustration depicts how FMD can affect the cattle industry. First, the illustration depicts that the disease will spread throughout the entire system. Second, the brown arrows indicate a negative feedback loop in consumption. Third, the red arrows indicate a negative feedback loop for production. Finally, the ERS predicts that should a FMD outbreak occur involving American cattle, it will cause the existing market price to drop approximately fifty percent.¹³² Thus, producers are in an economic dilemma regardless of their herd status.

¹³² Pender, *The Economic Impacts of FMD to Kansas*, 3.

APPENDIX C: FMD Backgrounder



Foot and Mouth Disease Backgrounder

(January 25, 2006)

Causative agent

Foot and mouth disease (FMD) is caused by a picornavirus; other members of this viral family include the swine vesicular disease virus, the human hepatitis A virus, and rhinoviruses. Picornaviruses are 22 to 30 nanometers (nm) in diameter, naked (unenveloped), and icosahedral in shape. The FMD virus (FMDV) belongs to the genus aphthovirus. The virus is a positive sense, single-stranded RNA virus. Most picornavirus species are host-specific and are highly resistant to most disinfectants.

There are 7 immunologically distinct serotypes of FMDV: FMDV-A, FMDV-O, FMDV-C, FMDV-ASIA1, FMDV-SAT1, FMDV-SAT2, and FMDV-SAT3. More than 60 subtypes of the virus exist.

Natural distribution

FMD appears to have been first observed in 1514 in Italy. Nine outbreaks of FMD occurred in the United States of America between 1905 and 1929, including serious outbreaks in 1905, 1914, 1924, and 1929. The U.S. has been free of FMD since 1929. The A, O, and C types of FMDV were first isolated in Europe, but have also been identified in South America. The SAT types are limited to the southern African territories. The ASIA type is only observed in Asia.

Foot and mouth disease affects swine, sheep, goats, deer, water buffalo, and other cloven-hooved ruminants. The virus is widespread but in 2005 fifty-seven countries were considered FMD-free without vaccination by the World Organization for Animal Health (OIE), four countries were FMD-free with vaccination, eight countries had FMD-free zones without vaccination, and four countries had FMD-free zones with vaccination (http://www.oie.int/eng/info/en_fmd.htm#Liste). The virus can persist in contaminated feed and the environment for up to one month. FMD is endemic in regions of Africa, Asia, South America, and Europe. Persistence in wildlife reservoirs contributes to difficulty in eradicating and controlling FMD.

Foot and mouth disease is considered to be the most economically devastating livestock disease in the world, and represents a worst-case scenario for livestock diseases because of the variety of species involved, rapid spread, and difficulty in controlling outbreaks. The 2001 FMD outbreak in Great Britain resulted in the slaughter of more than 6 million animals and an estimated economic loss of 20 billion dollars. The World Organization for Animal Health (OIE) classifies FMD as a listed disease that requires notification within 24 hours of its first occurrence in a free country or zone or reoccurrence after a previously eradicated outbreak. Immediate notification is necessary because of its rapid spread and substantial impact on the international trade of animals and animal products.

Transmission

Foot and mouth disease virus is spread via contact and fomites (including contaminated inanimate objects and people moving between infected and uninfected animals). Inhalation and ingestion are routes of infection. Outbreaks may originate in swine herds fed raw garbage containing infected meat, and are usually propagated by the transport of infected animals to markets or new locations. Introduction of an infected animal to a susceptible herd or insemination of a susceptible cow with infected semen may also initiate outbreaks.

Airborne transmission has been reported, and cattle may be more susceptible to this route of infection. Dispersion of airborne viruses is influenced by weather conditions.

The incubation period is usually two to five days, but may be longer in sheep and goats. The disease is highly contagious and infectious. Cattle may shed the virus for four or more days before clinical signs are observed. Swine shed larger quantities of virus once infected, and may be responsible for

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